

NEW
OBSERVATIONS
ON
INOCULATION.

By DR. GATTI,

Consulting Physician to his most CHRISTIAN
MAJESTY, and Professor of Medicine in
the University of PISA.

Translated from the FRENCH,

By M. MATY, M. D. Sec. R. S.

SUBLATO JURE NOCENDI.

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T O
DR. G A T T I,

DEAR SIR,

YOUR last offspring, which came to me in rich French dress, is now sent back in a plain English frock. You, who have read the Tale of a Tub, though a follower of Lord Peter, will not be offended, if, in taking off some of the trimmings, I should here and there have made rents in the cloth. If but few, you'll overlook them, since they were the effects of honest zeal in,

DEAR SIR,

Your faithful friend

and servant,

British Museum,
Dec. 7. 1767.

A 3

M. MATY.

PRELIMINARY DISCOURSE,

CONTAINING

A short Account of the present State of
Inoculation in France.

I Received this little tract from the author, towards the beginning of last spring, when I was confined to my bed by a severe fit of illness (*a.*) The seasonable relief which it gave to my mind, induced me to employ my sleepless hours in translating it; and I thought my labour not ill bestowed, if it could afford any entertainment or instruction to English readers.

Whether this piece will be received as well as my ingenious friend Mr. de la Condamine's Discourse on Inoculation, I shall not pretend to determine. To me they appear equally valuable; and the singularity of the present work may recommend it to a people, amongst whom those writers are peculiarly held in esteem, who thinking for themselves dare to print what they think.

In another country, indeed not his own, Dr. Gatti suffered for his boldness. Upon the recommendation of a French lady of distinction, (*b.*) whose son he had most happily inocu-

(*a.*) Quum me ægritudo non solum somno privaret, verum ne vigilare quidem sine summo dolore pateretur. Cic. ad Att. ix. 2.

(*b.*) Spouse to the Count de Durfort, Ambassador at Naples.

iv. PRELIMINARY DISCOURSE.

lated, he was invited over to the court of France. The minister thought him a proper person to establish the practice in that kingdom; and the inhabitants were supposed inclined to receive it from any quarter rather than from a nation at that time engaged in war with them.

Our Italian physician had, like his countryman Pylarini, learned the art of inoculating in the Levant. There he had seen the operation in its primitive dress, performed by Greek women, and recommended by Greek priests. The hand of surgeons was unemployed, the pen of physicians not desired. A needle was the sole instrument; a little matter imbibed in cotton, or dried in powder, the only *apparatus*. No accidents were known to happen; no troublesome ulcer or disorder to succeed. A gentle fever, during four-and-twenty-hours, was the only symptom; and a small crop of pustules, chiefly upon the part where the pock was rubbed in, without ruffling, lowering, or endangering the patient, secured his life, his organs, and his features.

To great sagacity my friend joined an open and beneficent mind. What he had seen, he proclaimed every where. He was in hopes that a people equally fond of novelty and ease, would readily adopt this new and elegant mode. The great, and especially their leaders, the ladies, he imagined, would be allured by being put to no fright and no pain, unre-

strained

strained in their diet; undisturbed in their joys; the people would be drawn in by an operation neither chargeable nor confining; all would be glad to enjoy the benefits of inoculation without its risks, and to spread it new fashioned all over the continent.

That eloquence of heart, which never fails to please, and seldom to convince, gave our professor great advantages over his rivals. In defiance of vulgar opinion and physical authority, he attempted to change an operose process into a mere amusement. Dr. Tronchin had had his short, his brilliant day, and Dr. Hofty, instructed in London, inoculated with care, and slowly made some converts. Our Italian was more prevailing than either. Every body would be inoculated by Gatti; and while he himself declared that any nurse could do as well as he, the public imagined nothing well done without him.

This uncommon success soon excited envy. Those, whose trade he obstructed, became his enemies. Rumours were propagated, and scruples were infused. To some it was said that he gave not the small-pox; to others, that his patients would carry it every where. The churches and play-houses were now no longer safe, whispered the delicate Abbe; and the still more insinuating doctor, shrugging his shoulders at the toilet, exclaimed against public infatuation.

Perhaps this might have been avoided, if Dr. Gatti had been more reserved, and obser-

vant of forms. A dutchess, whom he had inoculated, and who, upon equivocal symptoms without any eruption, had been declared secure against future infection, after three years caught the natural disorder, which, though not hurtful to her, became fatal to him. He displayed the utmost candor in publishing the case; but could by no means recover what he had lost, the support of the great, the confidence of the town. All his former patients took the alarm; he became the object of public abuse, as he had formerly been of general applause; and that salutary practice, which he had endeavoured to render popular, by making it more easy and more safe, fell as it had risen with him.

Indeed, it had already received a severe blow. The discouragement it met with from some eminent physicians, the impetuous attacks of a justly celebrated professor at Vienna (e) and above all, the religious scruples of a Saxon princess, influenced the parliament of France, then, and almost ever, at variance with the court. Upon the representations of the attorney-general, they thought proper to prohibit inoculation in the capital; and having thus prejudged the cause, gave orders to the faculties of divinity and physic to make inquiries into the merits of it.

The physicians took the lead, and doubtless with good reason, as the legality of the thing must ultimately depend upon its usefulness.

(c) Dr. de Haen.

The

The college, a numerous body, consisting of above one hundred and twenty doctors, appointed twelve commissaries, to make new researches, and prepare a report, upon this interesting subject. This committee, composed of the leaders of both parties, agreed upon five queries (*d*) to be sent all over Europe, in order to obtain new lights, and render, if possible, their judgment decisive and unanimous.

This, however, was not the case; for, though the answers which came, at least from those who were really qualified to give any, were greatly in favour of inoculation, an equal division of opinions still took place amongst the members of the committee; six declared against, and six for, the English practice. The former were the first in giving and publishing their *report* (*e*). This libel, for it deserves no
Q 2
other

(*d*) It may not be amiss to insert here these queries.

I. *Quæstio; an à longo tempore invaluerit in vestra regione insitionis variolarum methodus & quo successu?* II. *An nonnulli inter inoculatos occubuerint?* III. *An quidam variolarum inoculationem perpeffi variolas naturalis postea contraxerint & quo tempore?* IV. *An vobis compertum fuerit simul cum variolis alios diversi generis nonnunquam insertos fuisse morbos?* V. *An post inoculationem plurimi variis laboraverint ægritudinibus, quæ ex hoc fonte derivari viderentur, & an hoc frequentius rariusve fuerit quam à variolis sponte contractis?*

(*e*) *Rapport sur le fait de l'inoculation de la*
petite

other name, written with great art and no less disingenuousness, contains, besides the old and exploded objections of Wagstaff, Blackmore, Cantwell, and De Haen, a number of facts collected both in France and in Great Britain. The book no sooner appeared, but the most material of these facts, said to have happened in the first of these kingdoms, were publicly contradicted, and proved to be mistakes; and it would be no difficult task to do the same, with respect to most of those sent over from this island, were this a proper place for such a discussion.

Later, but not less keen, were the favourers of inoculation in their answer (*f*). The col-

petite vérole lu en présence de la faculté de Médecine de Paris & imprimé par son ordre, pour être communiqué à tous ses docteurs, avant qu'elle donne sur cette question l'avis que le parlement lui a demandé par son arrêt du 8 Juin 1765. In 4to. The six opposing doctors were, DE L'ESPINE, ASTRUC, BOUVART, BARON, VERDELHAN, and MACQUART.

(*f*) *Premier & second Rapport en faveur de l'Inoculation lus dans les Assemblées de la faculté de Médecine de Paris en 1764. & 1766. & imprimés par son ordre. Par M. A. PETIT, Docteur Régent de la Faculté de Médecine en l'Université de Paris, &c. Paris 1766. 2 vols. in 8vo.* The commissaries who signed this report were, besides the author, Dr. GEOFFROY, THIERRY, LORRY, and MALOET: the sixth, Dr. COCHU, published a separate report equally in favour of inoculation.

lege were induced by this last report, to declare, by a great majority of votes, that inoculation deserved to be *tolerated*. The parliament, however have hitherto not recalled their first order; the practice remains under the same unnatural interdiction; and it is only out of the walls of Paris, and especially in the provinces, that the people are suffered to save their lives in their own way.

Both to reclaim the thinking part of Paris, and to vindicate his own operations from the contemptuous treatment of his antagonists, Dr. Gatti, at my request, published the present Essay. Uncertain of its effect upon that lively and volatile nation, who received inoculation upon trust, and upon trust rejected it, he was desirous, by this translation of his work, to appeal to their neighbours, in hopes that, if they approve, his method will in time get the better of prejudice and clamour.

Indeed the English have already decided in his favour. Inoculation is very near universally, in this island, what he wished it in France. The choice of the matter, the manner of the operation, the simplicity of the treatment, the attention to amusements, and the injunction of exercise, are so many points, in which his practice coincides with that which is here generally recommended.

Had Dr. Dimisdale's performance (in which this doctrine, for some time industriously concealed by interested operators, was first brought
to

to light) preceded the discourse of Dr. Gatti, or could the one have borrowed from the other, I should not have taken the trouble of translating that of my Italian friend. But his piece was prior; and in a former treatise printed three years ago⁷, the same principles were already, though explicitly, contained.

But still it may, I know it will, be said, that if nothing was to be found here but what we knew before, the Public might have dispensed with this publication, as well as with three-fourths of the many ephemeroes pamphlets on the same subject, which this insect-producing summer brought forth. I can only answer, that the different way of considering the same objects, the closeness of the method, and the strength of reasoning, which distinguish the author's manner; the extensiveness of his views, and the novelty of his hints, were my motives for publishing his Essay in English. May I add, that I was besides animated by the desire of doing justice to an amiable character cruelly misrepresented, and not in France only injuriously traduced?

In one article, however, he differs from modern, as well as ancient, inoculators. He opposes what they recommend, a formal preparation. Yet as the mode of this preparation remains still unsettled, and where required, must vary according to the difference of constitutions;

⁷ Reflexions sur les préjugés qui s'opposent aux progrès & à la perfection de l'inoculation par Mr. Gatti. A. Bruxelles (Paris) 1764. en 8vo.

and as quicksilver and antimony, so much commended, and so indiscriminately given, by some, are not less warmly condemned, or at least slighted, by others, our author may perhaps trust his apology with the ingenious writer of the *Trial of Mr. Daniel Sutton, for the high crime of preserving the lives of his majesty's liege subjects, by means of inoculation*. He only exclaims against empiric or other medicines, when the subject is in full health; and expressly avers that, if he is not well, his cure ought to precede inoculation.

I am well aware that some other notions of Dr. Gatti may be objected to; but they seem to be of little importance to, and not intimately connected with, the main subject. Hypotheses, I know, are almost universally exploded; but few are the men, who do not except their own from this proscription. It is a matter of some difficulty to destroy old theories, without substituting new ones; to tread upon enchanted ground, and not be tempted to build, and to indulge and leave to posterity no visions of our own.

In translating this work, I allowed myself the liberty of abridging it in some parts, of supplying some things from the preceding treatise of our author referred to by himself, and of adding a few notes. In doing this, I had the advice of some of Dr. Gatti's friends, together with his leave; I followed my own taste, and hope to obtain the approbation of those who may compare the original with this copy.

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NEW
OBSERVATIONS
ON THE
PRACTICE of INOCULATION.

INTRODUCTION.

MANY books have been published within half a century, about inoculation; the authors of which, being mostly intent upon proving the benefits of the method, and paying no attention to the improvement of it, have neglected to determine and direct the best way of giving and treating the disorder communicated in this manner.

The rules laid down by the first introducers of the operation in Europe, have been exactly repeated; the way of inoculating taught in
B books

books remains what it was fifty years ago; and every where we find nearly the same directions with regard to the preparation, the manner of inserting the variolous matter, and the treatment of the artificial small-pox. I say the same, for it seems of no great consequence, whether the preparation is a little more or less rigorous; the insertion effected by an incision or a blister; the incision somewhat slighter or deeper; whether it is made in the legs or arms; whether the matter is used alone, or dried and powdered, or imbibed in a thread; and lastly, whether the purging is more or less repeated: these differences are too inconsiderable to make any essential distinction between the methods hitherto taught, or to occasion much variety in the success.

The apology of inoculation ought, however, to be attended with, if not preceded by, researches on the best method of inoculating: for if it is a salutary practice, when carried on in a certain way, but becomes fatal to many patients when differently managed, this defence will not be properly supported, unless the particular mode of the operation is previously determined and exactly pointed out.

From the inattention of those who have written upon the subject, might it not be concluded, that there really is but one method of inoculating; or if more, that they are equally good? that, provided the variolous matter be inserted, and the small-pox conveyed, all the rest is of no consequence; and if the operation should be more or less successful, or even if fatal

tal accidents should happen after it, that these effects are to be imputed to nature, to chance, to inoculation itself, but by no means to the particular method which has been followed?

Superficial observations may seem to strengthen this opinion. In looking over the accounts of inoculations performed in different times and countries, it appears, that much the same method has been pursued, both in happy and unfortunate cases; and even that the rules prescribed have been more closely attended to in the latter than in the former.

There is, nevertheless, a safe way of inoculating, and there are improper methods. By the one the disorder is attended with no danger while it lasts, nor any bad consequences when it is over. By the other, the patient is either exposed to a real danger, and a grievous illness, or may apprehend bad, and sometimes lasting, consequences after the termination of the disorder. There is a method by which thousands may be inoculated without the loss of any; and there are modes of acting by which the proportion, between those who die and those who escape, is considerable enough to startle the fond parent with regard to his children, and the courageous man with regard to himself.

The following facts will prove this assertion. In the little town of Blandford, 384 persons were inoculated; of whom thirteen died, a great number laboured under a confluent small-

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pox, and several were in the utmost danger of their lives.

In the course of the two last years, upwards of 9000 persons have been inoculated in Essex, without the loss of a single life, or the appearance of any accident.

I have made choice of these two facts, because they lay before us at one view a great number of inoculations. They are recent^(a); and happened in a state where all disputes about the utility of the method itself are at an end, and consequently where truth has nothing more to fear from party-spirit^(b).

Were we to pass a judgment from these two facts, on the supposition that in both cases the method was the same, and the difference in the success the mere effect of chance, we should be apt to conclude, that what has been said for and against inoculation is equally true. It is a

(^a) These facts have been related in the English news-papers; and a more distinct account of the Essex inoculations will be found in a pamphlet intitled, *Inoculation made easy, &c.* The notice of the Blandford miscarriages is to be seen in Dr. Baker's excellent *Inquiry into the merits of inoculating the small-pox, which is now practised in several counties of England.*

(^b) The translator would by no means vouch for the exact truth of these facts. A foreigner is not obliged to know the motives which in this country too often affect human testimony.
salutary

salutary practice; it is a murderous scheme^(c); and in this opposition of facts, the wise man might remain in suspense.

But if the methods were not the same, the two propositions ought to be altered into these: inoculation, when managed in a certain manner, may be dangerous; but if managed in another way, it is useful and salutary.

This last conclusion will be admitted by every unprejudiced mind. If the Essex people were inoculated differently from those of Blandford, as in fact they were, we shall be able to assert, that the former were inoculated in a proper, and the latter in an improper, manner; and consequently, that there is a right as well as a wrong method of inoculating.

The history of this practice will hardly furnish any other instance of so great an inequality; but a number of facts may be found differing enough to warrant the same inference; and my own experience would have led me to the same conclusion.

I have attended above a thousand inoculations, either performed by other people, or managed by myself; I have tried every known method; the rules prescribed have sometimes been observed, and sometimes neglected by me. By singular good luck, I have lost not one patient; but all the other accidents imputed to inoculation have fallen under my inspection.

(^c) This is somewhat exaggerated.

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Some have had a confluent small-pox, and been in danger; others have suffered, besides the small-pox, an additional infectious disorder. Many have had troublesome complaints after the operation; wounds not easily healed, erysipetulous tumours, abscesses, imposthumes; and lastly, some thinking themselves safe after having gone through what was thought inoculation, have since caught the distemper in the natural way.

Notwithstanding these inconveniences, I have continued recommending and practising inoculation, both because they are far less considerable than those which attend the chance of the natural small-pox, and because the worst of these mischances happened to me more rarely than to most other inoculators.

I now think, I have discovered the cause of all these accidents. Had I from the first made choice of the best method, every one of my patients would have had a true small-pox, both slight and kind, and attended with no bad symptoms, adventitious disorders, or consequential complaints. I was misled by the rules generally laid down; and an opposite way of acting would always have conducted me safely, as in fact it did, whenever I kept to it.

The following tract is the result both of my experiments and of my reflections. My design is not to apologize for inoculation, but to enquire into the best method of managing it.

I write for gentlemen of the profession, and especially for such as have acquired some experience

rience in the art of inoculating. They alone are capable of forming a true judgment and estimation of my assertions, and can induce the public to adopt my practice. In medical matters, the generality of mankind think not from themselves, but from physicians; and the method which I propose will not be regarded, unless authorized and adopted by them.

But how can I hope for their approbation? My notions seem totally different from those which are commonly received; my rules directly opposite to those which have hitherto been laid down; and, in one word, my aim is to prove that we should think the contrary of what has been thought, and do the reverse of what has been done.

Ever since inoculation has been received in Europe, the practitioners have been of opinion that the essential advantages of the artificial over the natural small-pox were, 1. the preparation; 2. the discharge of the variolous matter by means of the wounds; and 3. the assistance of art in a disorder which is known as soon as it appears.

In opposition to these principles, I shall attempt to prove, that these three pretended advantages have hitherto been so many bars to the perfection of the method, and the source of almost all the miscarriages which have retarded its establishment.

All inoculators have said, prepare your subjects; procure an outlet to the venom; be at-

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tentive to administer every help of art, when the disorder shews itself.

I, on the contrary, say, prepare not at all; think of no outlets; and when the disorder comes, trust to nature.

These propositions I purposely premise, that the reader, startled at their seeming absurdity, may the more attentively examine what I have to offer to support them.

Though I should be right, I hardly expect that all operators will, at least for a long while, come into my way of thinking. But I entertain better hopes from those physicians, whom knowledge and virtue place above prejudice. I trust to time, which sooner or later silences passion, and gets the better of prepossession; and should I be disappointed, I flatter myself to find a sufficient reward in the testimony of my conscience, that I have always sought the good of mankind, and laboured for the discovery of truth.

The doctrine which I endeavour to demonstrate is so plain, that I might have brought it within the compass of a few pages; but it is necessary to explain it, and to establish it upon proofs, in order to remove the prejudices still entertained by many people.

All I have to say will be reduced to three heads. The first regards the preparation; the second, the insertion; the last, the treatment of the disorder. I intend, as much as possible, to forbear any enquiry which does not directly tend to my object, viz. the best method of inoculating.

C H A P.

CHAP. I.

ON PREPARATION.

PREPARING a subject for inoculation is endeavouring to give him such dispositions, as it is thought will fit him to go through the small-pox, with as little prejudice to his health as possible.

These dispositions, thus intended to be procured, are understood to be relative to the small-pox, and so peculiar to that disorder, as not to be preparatory to any other.

The preparation, by which these particular dispositions are to be procured, should therefore be particularly adapted to the disorder which is expected. It ought to be founded upon some known analogy between certain dispositions of the animal œconomy and the effects of the variolous virus upon the said œconomy; or at least upon an experimental knowledge, that such or such dispositions are always productive of a slight and mild small-pox.

It follows from this explanation, that, in order to prepare for inoculation with any degree of certainty, we should be acquainted with some dispositions in the animal œconomy distinct from a general state of health, and particularly relative to the small-pox; such as, on the supposition of two subjects enjoying an equal share of health, and every circumstance being in other respects the same in both, he who has those particular

particular dispositions should constantly, or mostly so at least, have a mild and safe small-pox ; and he, who has the contrary dispositions, should have it dangerously, and often mortally.

To illustrate this : suppose it had been constantly observed that lean people had fewer and kinder small-pox than fat ones ; these last might be prepared for inoculation, by lessening their fat, and reducing them by means of a strict diet to a state of leanness. It is, however, plain that, in order to attempt such a preparation, it must have been demonstrated from repeated experiments, that leanness is a favourable disposition for receiving the small-pox with as little detriment as possible to health.

But if no observation has discovered that such or such disposition is more favourable than the contrary one to have the small-pox in the most harmless manner ; if the observations made for 1100 years upon the natural, and for upwards of fifty upon the inoculated small-pox, leave us in that respect under the greatest uncertainty ; what are we to think of preparations intended to procure particular dispositions, which no body knows with certainty to be more favourable than the contrary ones ? Now this is by no means a supposition, but a fact, which every ingenuous physician will readily agree to.

We see this disorder severe or slight, dangerous or harmless, indiscriminately in strong or weak, lean or fat people ; in constitutions
called

called hot, or in those which are said to be cold; in dry and in moist habits; in bilious and in phlegmatic subjects. Let us but examine impartially the observations, which have been transmitted to us upon this distemper, let us recollect the small-pox we have seen, whether natural or artificial, and we shall be obliged to confess that the constitutional dispositions, on which the mildness of the disorder depends, are to us entirely unknown, either because they have not been observed, or are beyond the power of observation.

Hence I think myself entitled to conclude, that there is no disposition, at least known to us, particularly relative to the small-pox, and enabling a subject to receive it in that manner, which is least detrimental; and consequently that there is no such thing as preparation for inoculation, in the sense we have affixed to that word.

But if we are ignorant of any particular disposition, we are certainly acquainted with a general one, which is absolutely requisite towards going through the small-pox with as little danger as possible; and that disposition is health itself. The venom applied, and the disorder consequent upon this application, are attacks upon health; and the hurt must be greater or less, as the constitution is weaker or stronger. Experience has shewn, that this disposition is always attended with a kind small-pox, provided other causes, or some error in the insertion or treatment of it do not increase the disorder, and disturb nature in her operations.

tions. Health therefore is all we want in a subject intended for inoculation.

Granting this, it is evident that there is no need of preparation for a person in full health; and that for one who is not well, the only preparation must be to make him so.

The art of preparing for inoculation is, therefore, no other than the art of curing; and the rules which might be given for the one, are the same which the art of healing prescribes for the other. But to cure a sick person, or to defer giving him the small-pox till he is well, is not properly preparing him for inoculation; on the contrary, it may fairly be said that no intended patient wants any preparation. If he is well, inoculate him; if he is ill, cure him as you would in any other case.

All previous preparation relative and peculiar to inoculation is not only needless, but dangerous, on account of the mischief which may be done, by altering the state of a person in health.

But to remove all doubt, it may not be amiss to answer some objections, which might be started, and which contain the most plausible arguments which have, or might have been, urged in favour of a particular preparation.

FIRST OBJECTION. “ Granting that health
 “ is the only requisite in your intended patient,
 “ you must allow that what is called so admits
 “ of

“ of great latitude. Many degrees may be
 “ conceived from strong to weak health, and
 “ from thence down to sickness. A man in the
 “ most perfect state is an imaginary being;
 “ and between compleat health and the priva-
 “ tion of it, or sickness, there are numberless
 “ middle states, in each of which a man may
 “ be said to be well. Therefore, though he is
 “ so, some preparation may be proper, if not
 “ absolutely necessary, to mend his constitution,
 “ and bring it as near as possible to the most
 “ perfect state.”

ANSWER. The care of our health ought,
 at all times, to be attended to; it is the chief
 of all blessings. Preparation is extremely use-
 ful in that view; it is even necessary for those,
 who, from their duties in life, the pursuit of
 pleasure, or other circumstances, are apt to
 live so as to injure their health; and on such an
 occasion as inoculation, it behoves them to be
 more particularly careful than they can well be
 in the common course of life.

Preparation, thus explained, implies a closer
 attention to avoid whatever might be detri-
 mental; it is negative, consisting of privations,
 not remedies; and as those privations only re-
 late to excesses of any kind, such as labour,
 eating, drinking, &c. it is plain that this is no
 particular preparation, according to our former
 definition.

We often see people enjoy excellent health,
 though living in a different or quite opposite
 manner with regard to their diet, exercise, or,
 in

in short, to what physicians call the fix non-naturals. We see, on the other hand, that they are not well, whenever they attempt to change their way of living for that of another. Custom, which is a second nature, can never be altered without danger, even in trifling things, though the change be from worse to better. If any alteration was to be made in a healthy man's way of living, under the notion of improving his health, this ought to be tried at any other time rather than at the eve of inoculation. The good expected is uncertain; the ill that may ensue, though at another time of no great consequence, might at this prove very pernicious.

Were it even certain that any change or positive preparation, would be attended with an encrease of health, still this advantage ought to be balanced with the hazard arising from the dread which this previous process often occasions; and of what consequence this may be, will appear in the sequel of this work.

If, after a serious perusal of these considerations, any inoculator will attempt to give rules for a health-encreasing preparation; if he chuses to prescribe a diet, or to order medicines; his preparation will probably bring on a more considerable disorder than would otherwise have appeared; and some of his patients will deserve the epitaph,

*Stavo bene;
Ma per volere star meglio
Sto qui.*

SECOND OBJECTION. “ The idea of health
 “ is a complicated one. Two persons equally
 “ healthy may have very different constitutions.
 “ The small-pox is an inflammatory disorder ;
 “ and the more a constitution inclines to in-
 “ flammation, the more dangerous the distem-
 “ per will prove. Thus a stout and sanguine
 “ man, as healthy at least as a weakly or de-
 “ licate one, shall have a more severe and
 “ dangerous small-pox. This tendency to-
 “ wards inflammation must therefore be lessen-
 “ ed ; preparation is necessary for that pur-
 “ pose, and cannot be dispensed with without
 “ rashness.”

ANSWER. 1st. The small-pox is not abso-
 lutely an inflammatory disorder. Inflamma-
 tion, which constitutes the essence of some dis-
 orders, in this is only a symptom ; indeed, a ne-
 cessary one, since there can be no pustules
 without it. 2. Granting that the small-pox was
 in itself an inflammatory disorder, we have no
 certain criterion to know, whether a subject has
 a disposition towards inflammation. 3. If we
 had such a criterion, we should still be at a loss
 to determine to what degree this disposition
 ought to be lessened. 4. Lastly, the means
 employed for that purpose, which are chiefly
 bleeding and purging, may, and often have, a
 contrary effect.

These two objections are the only rational
 and intelligible ones, that can be alledged
 against my assertion with regard to the inutility
 and dangers of preparation. As to others,
 grounded upon the necessity of sweetening the
 humors,

humors, purifying the blood, cooling it, &c. (forms of speech unfortunately in vogue in the world) I own I do not understand the meaning of these words, and I am convinced no body does. I may therefore spare myself the trouble of shewing the absurdity of all rules founded upon these notions; and shall take it for granted, that all sensible people must be satisfied that a subject who is not well should be cured, and not inoculated; and that one who is well ought to be inoculated, but never be prepared.

Many inoculators, being aware of the inconveniences of regularly preparing a healthy person, have contrived specific medicines, in order to diminish the energy of the virus, and in consequence to lessen the disorder. I have tried some of these specifics; such as mercury, antimony, the bark; but always found they did more harm than good. I may, indeed, have used them in an improper manner, or there may be other species that I am not acquainted with; but since those patients who did use them, had not a slighter disorder than those who did not, I cannot help looking upon them as bordering upon quackery. May they not be deemed a contrivance to secure to operators that advantage, which perhaps gave rise to preparations, by inducing the public to attribute the success of inoculation to the skill of the inoculator?

I shall close this article by appealing to experience, the great, and perhaps the only, test in medical matters. It strongly confirms the principles I have laid down.

In

In those countries, where inoculation has been most successful, where it is attended with little or no danger, where thousands are inoculated, and are hardly sick at all, in a word, throughout the East, the operators only enquire, whether the person is in full health.

The history of inoculation in Europe must convince any man, who does not wilfully shut his eyes against light, both of the inutility and danger of preparations ; by shewing, in the several countries where inoculation has prevailed, how these preparations have been productive of untoward consequences, in proportion to the use that has been made of them ; and how accidents are become less frequent, in proportion as preparations have been more simple, or quite laid aside.

In the first period of the London inoculations, great stress was laid upon preparation; the method was complicated and tedious, the patients were worse, and more of them died. But since preparation has been more disregarded, the disorder has been slighter, and fewer have been lost. I could quote some of the most eminent and successful inoculators, who wholly omit preparation, and some who openly declare against it.

Even in France it is visible that, within these five or six years, inoculation is become more successful, and is attended with fewer bad consequences, since less stress has been laid on long and severe preparation. Let those physicians, at Paris, who, practise inoculation, declare,
C whether

whether it is not strictly true, that they have relaxed from the severity of their preparations; and whether inoculation is not now more prosperous in their hands, than it was some few years ago?

Give me leave here again to alledge what I have met with in my own practice. I may safely say, that those of my patients, who have fared best, have been such as had been no otherwise prepared than by stating or restoring their health; and when the disorder has been more violent, or has left any bad remains, it has constantly been in such as I had more or less prepared, according to rules.

Lastly, of all the cases where inoculation has proved mortal or dangerous, not one perhaps will be found upon enquiry, where the patient had not been previously prepared; and to the excessive care in this article, physicians themselves have often imputed their ill success. This being the result of all I have read or observed concerning inoculation, let the consequence be drawn; I think it cannot be favourable to the doctrine of preparation.

This doctrine has not only been laid aside or softened by physicians in their practice, but if you look into the works published from time to time both in England and France, you will find, that even in theory, the severity and importance of preparation is much less insisted on; and the latest writings come very near my opinion.

One of our most eminent physicians, in a work printed four years ago *, asserts, that every subject must be prepared at least for one month ; and that during that time he is to be blooded, physicked, and vomited, &c. But in later times Dr. Petit, the author of the excellent *Report in favour of Inoculation*, says, that if the subject is healthy, strictly speaking, he wants no preparation ; and that if he is sick, the preparation consists in the curing of him. Could the contrast between the two methods be more striking ?

But it would be trespassing upon the patience of my readers, to take up any more of their time in proving this self-evident truth, that the best disposition for having the small-pox safely is health ; and that this disposition, when found in any subject, ought by no means to be disturbed under pretence of preparing him.

All that is requisite is to ascertain this disposition, and this is easily done. Health, we all know, is the faculty of exercising constantly, and with ease, all the functions suitable to the age, the sex, or the constitution of each individual. Now any one is able to judge whether a subject has, or has not, that faculty ; and the person himself, or those about him, can tell that with more certainty than any physician whom they could consult. A man is in health when no pain or weariness warns him of any disorder in his frame.

* *Observations sur la petite verole naturelle & artificielle.*

Although it is impossible to determine geometrically the degree of health requisite for inoculation, you may safely trust to that indeterminate judgment we commonly pass, when we say, such a one is well: we mean that nothing amiss is observable, nothing at least that attacks the vital functions, nor any tendency to sickness, as in children during dentition, or women during pregnancy, &c.

But besides this general rule, the fitness for inoculation may be determined with greater certainty by a few plain and easy signs; viz. 1. the sweetness of the breath; 2. the thinness of the skin; 3. the facility of cicatrization. I do not know whether these signs only indicate the state of which we call health, or whether they denote those unknown qualities, which are favourable to the action of the virus: but certain it is, that I have always found them to be attended with a mild small-pox, in proportion to the degree in which they were observed.

CHAP. II.

ON INSERTION.

INSERTION is the application of the variolous matter to some part of the human body. It is well known, that this application takes effect only on some sensible part; therefore, if it is made externally, it must be under the cuticle or scarf-skin, which is an insensible membrane. It is likewise known, that the activity of the virus is so prodigious, that the smallest atom, imperceptible either by sight or feeling, conveys the small-pox equally well with a large quantity.

Hence the most obvious way to perform this operation seems to be, to prick the skin slightly with a pin or needle dipt into a variolous pustule. As nothing is requisite to infuse the poison into the animal system, but to introduce it beyond the scarf-skin, a slight puncture, which divides the membrane, must have appeared sufficient to the earliest operators. The dreadful effects of the poison, which these inoculators had observed in the natural small-pox, could not but make them sparing of it in their first attempts; and tender parents would naturally be equally fearful, and unwilling to put their children to unnecessary pain.

Accordingly we find that, at the first origin of inoculation, in several countries, but especially in those where it was performed by women, the insertion was made in that simple manner.

manner. The famous Theſſalian, who firſt introduced it in Conſtantinople, did nothing more; neither did ſeveral women who carried it into the iſlands of the Archipelago, where to this day it is performed in the ſame manner.

In the dutchy of Urbino in Italy, a grievous epidemical ſmall-pox, that raged in the year 1746, induced ſeveral mothers, alarmed at the havock it made, to try to ſave their children by inoculating them; they had only been told that the thing was practicable; and could think of no other way than to prick the ſkin with a pin dipt in matter.

Such was the voice both of nature and reaſon; ſuch the practice of the firſt inoculators; fathers and mothers inoculated in this manner; and ſo it is that women have always gone about it. Let us now ſee what art has added, what phyſicians have done. Soon did they forſake this plain and natural road; ſoon they deviſed new and intricate by-paths. Inſtead of a puncture, an incifion was made; the depth was gradually increaſed; both arms were cut, then the two legs, ſometimes all the four limbs. Inſtruments were contrived for making theſe incifions; and to a ſimple operation, which required no care nor apparatus, a variety of inventions were ſubſtituted, requiring a long and cloſe attendance, and productive of moſt evils charged upon inoculation, though merely owing to the way of inoculating.

Theſe ſeveral methods, after having deviated from the former ſimplicity, are gradually become

come less complicate : I shall therefore only examine that which is least faulty, and comes nearest to the original practice. By shewing the inconveniencies which attend it, I shall evince the still greater absurdity of more complicate methods, and the necessity of returning to the primitive operation, as being the most natural, the easiest, safest, and the only one than can be recommended.

Most inoculators actually proceed in the following manner. They make a slight incision or two, only skin-deep; and apply to the wounds either a thread impregnated with matter, or the powder of variolous scabs, secured with a plaister.

This method, simple as it appears, still differs widely from the former, both in itself and in its effects. 1. The first mischief is its being attended with an apparatus and solemnity both needless and hurtful. The business may be done in an instant upon a sleeping child, with little or no pain, if you prick him with a needle, without acquainting him that you are going to give him a distemper. By the other method he must undergo a painful incision, or more than one; a surgeon is employed; sometimes the physician is present; and an operation thus ushered in cannot fail to terrify the child, and set him a-crying. These impressions, though seemingly slight, may greatly affect the success of the whole, as will be shewn hereafter.

2. The infected thread contains an infinite number of those atoms, one of which is suffi-

cient to give the small-pox; is it likely that so great a difference in the quantity of this poison, should occasion none in the nature of the future wound? Is it not rather certain, that, *cæteris paribus*, both the inflammation and suppuration, as well as the number of pustules raised round about the incision, are proportionable to the size of the thread? Every inoculator, as well as myself, must have observed this difference, especially when the insertion is made in two places.

Undoubtedly a greater inflammation, and a more copious eruption about the wound, must add to the greater violence of the disorder. Dr. Lunadei, an Italian physician, is the first who has taken notice, that those whom he inoculated with a pin, were neither so full nor so sick as those, who underwent the common operation. I observed the same thing; and am now far from thinking, as I formerly thought and said, that it is all one whether you put in more or less matter, just as it is whether a mine is set on fire with a spark or a live coal. It is all one as to giving the small-pox, but not so as to the other effects it will have upon the animal system.

3. When the puncture is once made, you have nothing more to do, either before or after the eruption: the little orifice is soon closed, and one or more pustules appear upon the scar, of the same nature and duration with those of the other parts, and requiring no farther care; whereas in the usual method, the eruption about the wound is obstructed, and the humor, which should

should have raised the upper skin and formed into pimples, meeting with an easier passage through the incision, or finding the cuticle softened or wasted by the plaister, necessarily brings on an ulcer. This must be dressed for a fortnight at least; and whilst the principal disorder employs the inoculator but two or three days, the incisions require his attendance for several weeks. Thus a complaint is produced both tedious and painful; and not only needless, but also prejudicial to the success of inoculation. It even happens that the ulcer will not heal up, but grows so deep and foul, that the surgeon cannot conquer it in many months; and the patient must suffer a thousand times more from this, than from the small-pox itself.

4. It is well known, that sometimes inoculation leaves other bad remains; such as *erisypelas*, tumors and abscesses, which are very troublesome, and may become fatal. That this is altogether owing to the wounds, will appear if we consider 1, that these complaints never come after the natural small-pox when mild; 2, that they sometimes happen after a confluent pock, when, by opening of the pustules, or by some other accident, ulcers are formed in the legs, or elsewhere; 3, that in inoculated persons, these sores, &c. always appear on the side of the insertion, when single; and when made on both arms or legs, then on that where the incision was deepest, and the wound had spread most; and 4, that nothing of this ever happens, when there has been no wound at the place of insertion, but only an eruption. These four observations

vations evidently shew, that such accidents arise merely from the incisions, and the treatment of them, and that a skilful practitioner may avoid them if he pleases.

5. By the common method, you are sometimes at a loss to know whether the infection has taken place. The inflammation which appears about the wound, a few days after the operation, is looked upon as a sure proof; but there can be no certainty in this sign, unless you are well assured that it was produced by the variolous matter, and not by any other cause. This you can hardly be, when an incision is made; whereas there can be no doubt from a simple puncture. This presently heals up, and you clearly discern whether the succeeding inflammation is the effect of the needle, or of the infected matter. In the common way, you must take in the effects of the thread and of the putrid matter itself, not merely as conveying the infection, but as extraneous and offensive bodies: and to these are to be added the action of the plaister and of the air. These last causes may produce an inflammation, and about the edges of the cut that white eschar, which inoculators look upon as a decisive sign of the success of their operation. This inflammation often becomes erysipelatous, as in any other wound covered with a greasy plaister; and it may equally bring on pustules, which break out, suppurate, and vanish in one day.

The imperfect likeness of these effects to those of the *virus*, has sometimes misled inoculators; who, imagining that the venom had
acted

acted upon the body, and seeing no ensuing small-pox, hastily concluded, that either the subject was not susceptible of infection, or that these appearances were in him equal to the distemper, or the small-pox itself. Hence they pronounced him safe from ever catching it, and neglected to repeat the insertion. But a subsequent natural small-pox shewed that the inoculator was deceived by equivocal signs; and inoculation suffered from his oversight, or rather from the unavoidable uncertainty of the common method.

The enemies of the practice have never failed, upon these occasions, to depreciate it with the public; as most people are ignorant of the difference between being inoculated, and having the small-pox by inoculation; between equivocal signs and a real infection; the accidental suppuration of a wound, and that which necessarily succeeds the variolous fever; and lastly, between pimples that fill and dry off almost in one day, and the true pock, which keeps out nine days at least.

But the cicatrix remaining at the place of insertion, will be a standing monument of the success or failure of it. When the patient has really had the small-pox, this scar is either round, like the mark of a pustule, or oval; but always large enough to be evidently that of an ulcer, and not of a mere incision, as it is when the operation has failed.

By the puncture all errors are avoided. If it brings on ever so slight an inflammation, a few days

days after it was made, it is a sure sign of its efficacy; and the succeeding pustules, having all the characteristics of the true small-pox, can leave no doubt of a genuine infection.

Thus have I summed up the chief disadvantages we meet with in practice. They have hitherto been placed to the account of inoculation; but I am confident they are solely owing to the manner of performing it. When time, the great restorer of truth, brings us back to the good old method, we shall hear no more of them, and inoculation will be fully vindicated.

I am sensible that many objections will be made against this doctrine. The two principal ones deserving any answer are these:

FIRST OBJECTION. “An insertion made
“by a puncture cannot make way for that co-
“pious outlet, which a wound affords to the
“variolous matter, and which constitutes the
“greatest benefit of inoculation.”

I have in a former work declared my opinion as to the supposed benefit of an outlet, during the course of the distemper. I still think, that this whole doctrine is founded upon superficial notions of the animal œconomy, and a want of due attention to the phenomena of inoculation. Most physicians will, I believe, upon duly weighing my reasons, think, and, what is more, speak as I do.

For,

For, first, it appears from what has been said, that the discharge at the place of the incision is only occasioned by the matter, which would in that part have produced a cluster of pimples, and not from those of the other parts of the body.

2. Pierce one of the pustules with a needle, so as to let out all the matter, after ten or twelve hours it will be found full again; and by repeating this operation ten or twelve times, the discharge will be proportionally increased, and yet the same quantity remain in all the other pustules.

3. Opening every pustule in order to discharge all the matter, has been frequently attempted, and would certainly be a salutary practice, were the doctrine I oppose founded upon truth. But far from answering the end of thus exhausting the variolous *fomes*, or preventing the translation of the matter upon nobler parts, new matter was formed as fast as the old was evacuated; the discharge from each pustule was as great as if only one had been opened; the disorder full as dangerous, and much more troublesome; and this process, which in theory appeared excellent, was universally laid aside, as useless, if not pernicious.

4. Lastly, It has never been observed, that a plentiful discharge from the incision was a sign of a slighter disorder. It is, on the contrary, never so considerable as when the discharge is so; and this always keeps pace with the number of
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the pustules. He therefore, who desires a copious outlet, wishes for a considerable degree of danger ; and whoever is uneasy at the scantiness of the discharge, shews himself ungrateful to nature, and complains of art, when he has most reason to praise it.

SECOND OBJECTION. “ So slight an insertion
“ does not communicate the small-pox so cer-
“ tainly as the other method.”

Several answers may be made to this objection.

1. The inconveniency of missing the small-pox, is of less consequence than the accidents, which may arise from giving it in the common way. When the operation fails, it produces no other effect than the pricking of a pin, and must be repeated.

2. This insertion may be made in several places, without introducing so much of the various poison as is conveyed by the usual method, or having the same mischiefs to fear. I have inoculated in this manner in five or six places, without the least inconveniency; I only thought the patient had rather a more plentiful crop, and the disorder was somewhat more considerable, than when I made but one puncture. Two or three of these will more effectually communicate the small-pox than the common incisions.

3. In

3. In fact, inoculation is sometimes known to fail, whatever method is used ; nor do I think this will happen oftener by this than by any other. We see many patients inoculated with fresh matter, in the usual and strongest manner, yet without any eruption, who afterwards have the small-pox, either in the natural way, or upon a second trial. We likewise daily see people, often and long exposed to the infection, thinking themselves safe, who have afterwards caught the natural disorder. It is certain, there are some who never have it; whole families are free from it for many generations; and it has been observed, that upon a hundred persons dying of old age, five or six had escaped it, though equally exposed with their contemporaries. Inoculators have met with much the same proportion of fruitless attempts. A person in this case can never have an absolute certainty of being for ever safe, but only a probability proportionable to the number of experiments, the goodness of the matter, &c.

It certainly is a *desideratum*, to be able constantly to communicate the small-pox if the subject is capable of receiving it; or to know, in case of failure, where the fault lies. It is to be hoped this problem will one day be solved, when all disputes about the expediency of inoculation are at an end, and we fix our whole attention on the improvement of it.

In order to attain this desirable end, I would recommend the following rules:

1. The

1. The freshest matter is the most effectual^(a). Whenever therefore it can be done, the insertion should be made immediately with a needle just dipped in the pus of a pustule. The beginning of suppuration is preferable to a more advanced state, as the matter is then more fluid, and comes off easier from the needle into the wound.

2. Instead of barely pricking the skin, the point ought, if possible, to be introduced between the cuticle and the inner skin, to the length of a quarter of an inch, which is easiest done with a flat-pointed needle. The impregnated needle will keep its virtue for several days, provided it is not rubbed against any thing; but it is always safest to use it soon.

3. Instead of the needle thus dipped, a cotton or filken thread may be used, that has lain some time, and been rubbed with pulverized variolous scabs. This thread may be drawn in with a needle, between the scarf and the true skin, to the length of two or three lines, but not left in. This is the method throughout the Indies.

^(a) I have long suspected, that the variolous matter became milder by inoculation; and consequently, that a repetition of the like operations would still render it more harmless, though not less efficacious. This conjecture is now to me become a truth, from the experiments I have tried, and those which were made in England by the most experienced inoculators.

4. A lancet

4. A lancet may be used instead of a needle; and if only scabs are to be had, the scarf skin should be separated from the true skin, and a little of this powdered matter rubbed against it; the raised cuticle is then to be let down again, and pressed with the finger to make it stick to the skin.

5. Whether a needle or a lancet is employed, care must be taken to apply the matter to the live skin, without going through or tearing it.

6. The variolous virus being thus transferred from the needle, thread, or lancet to the live skin, which lies under the cuticle, this last will sufficiently keep it in, and no plaister is ever to be used.

7. The fittest part for insertion seems to be between the thumb and fore-finger, on the outside of the hand. They do it so in India, Syria, Egypt, and Barbary; and it is preferable on many accounts: the hands are always exposed to the air; the inflammation, which the insertion necessarily brings on, is *cæteris paribus* smaller, and less troublesome, where the skin is least stretched, as in this wrinkled part; the insertion is more easily made there than any where else, because the scarf-skin is thicker, and harder to break; and lastly, the symptoms attending the insertion are more easily observed.

8. These advantages, however, are not so considerable as to make one apprehensive of any great risk from the choice of another place.

In general, some part of the arm is best; but the legs should never be chosen; for there the pustules are longest a-drying, ulcers are most often formed in the flux small-pox, and continue longest. The Thessalian woman, who inoculated in the forehead and chin, made a better choice than those who inoculate in the legs.

A recent fact, well known and well attested, plainly shews the good effects of the method I am contending for.

In some counties in England, where inoculation has for these two or three years been carried on with a success hitherto unknown in Europe, it is performed in the following manner:

The point of a lancet being dipt into a pustule, and moistened with the matter, the person who is to be inoculated is immediately pricked in the arm, so as to introduce the point between the scarf and true skin. The operator then presses down the scarf-skin again with his finger, and all is done. No plaister or fillet is ever used. A few pustules appear afterwards on the part, but never any wound, ulcer, or discharge. Above twenty thousand people have already been inoculated in this manner*.

I now come to the method of treatment I would recommend; and likewise hope to advance some new truths upon this head.

* The authenticity of these numbers must rest upon the credit of the operators.

C H A P.

C H A P. III.

ON THE TREATMENT.

THE object of inoculation is to give the small-pox with as little prejudice to health as possible, or, in other words, to bring on as slight a disorder as we can.

What has been said on preparation and insertion, tends directly to that end; but the subject before us is still more closely connected with it, and consequently must be the most important part of our enquiries.

Indeed, if the patient is healthy; if he has not been hurt by any preparation; if, lastly, the insertion has been well performed; the ensuing disorder will almost infallibly be favourable, whatever pains may be taken by art to render it dangerous, either by neglecting the means of mitigating, or by substituting such as must increase, it.

But though not dangerous, the disorder may be more severe to some people; and it would be both unreasonable and inhuman not to afford them all the helps which may abate it, and remove the very suspicion of danger; and the more so, as, of all acute disorders, of which the small-pox is one, none perhaps will admit

of such effectual, and yet simple and natural, helps.

Four periods are distinguishable in the inoculated small-pox. The first is that of *insertion*; the second, that of *local eruption*; the third, that of the *fever*; and the fourth, that of the *general eruption*.

The first period lasts from the time of insertion to the first visible effect of the infectious matter, which shews itself by a slight inflammation at the place of insertion.

The second extends from the first effect upon the part, to that upon the whole animal system, or the first feverish symptoms.

The local inflammation at the place of insertion, is a real eruption of one or more variolous pustules, of the same nature with those that appear in other parts of the body when the eruption begins. Sometimes there is a red spot, or a cluster of spots, like flea-bites, which afterwards rise into real pustules. Sometimes a single pimple appears, having the little orifice for its center; and at other times it is a cluster or group of pustules, like the confluent small-pox.

Hence it appears, that the venom acts first upon that part where it was applied, and there produces a variolous eruption, as it does in other parts.

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When, instead of a puncture, an incision is made, the eruption appears both upon, and round about it; and brings on that inflammation, which is esteemed a sign that the infection has taken effect. But as this incision, and the treatment of it, prevent the variolous humor from shewing itself under a pustular appearance, inoculators have not sufficiently attended to the nature of this inflammation, or to the period of this local eruption.

The third period takes place from the beginning of the fever to the general eruption. Indeed, the first sensible effect of the venom upon the whole frame, is not commonly a fever, but a pain at the groin, *axillæ*, or loins, and a heaviness in the head; but as these sometimes fail, are always slight, and are soon followed by the fever, which is the only constant symptom of the variolous ferment acting upon the whole animal system, the first appearance of this fever fixes the beginning; and its cessation, when the eruption begins, the end of this period.

The fourth takes in the whole time of the general eruption to the falling off of the scabs.

This eruption once come out, the fever goes off, as do all the other symptoms of the foregoing period; those which now succeed are no longer the effect of the immediate action of the virus, which spent itself by the eruption, but are owing to the inflammation and suppuration of the pustules. Each of these is a

small inflammatory tumor. When there is a large crop, and the whole body is covered with them, their inflammation and suppuration must of course bring on a fever, with all the symptoms incident to inflammatory disorders. These would equally take place, were a patient's body covered with such a breaking-out, though of another nature, and from a different cause.

When the pustules are few, the inflammation and suppuration have very little effect; when there are none at all, this last period of inoculation does not exist, and the disorder ends with the eruptive fever.

The description of these four periods plainly shews the progress of nature in inoculation. The matter applied by insertion produces the small-pox upon the spot; this local eruption then acts upon the whole body, and brings on the general disorder.

The animal system is by no means affected in the two first stages of inoculation; and therefore no alteration need be made in the patient's usual way of living, and no treatment is requisite during that time. But in the two last periods, the patient is really ill, and must conform to such rules as may lessen his disorder.

But though these last periods constitute what is called the disease of the small-pox, that appellation really takes in two disorders, distinct from each other, as well in their nature and
their

their cause, as in their symptoms and duration. The one is the effect of the immediate action of the venom; the other of the inflammation and suppuration of the pustules. The first is nervous; the second inflammatory.

It is necessary to observe, that the local inflammation and suppuration, which preceded the first stage of the real disorder, and sometimes are prolonged and even encreased during its progress, combine their effects with those, which arise from the universal variolous affection. This remark is the more important, as it points out the most essential difference between the natural and artificial disorder.

Inoculation shews that the part, where the matter is applied, is constantly the first affected, and is more so than any other. This part becomes the seat of an eruption, and consequently of inflammation.

In the natural way, the venom dispersed in the air is mostly conveyed by respiration into the lungs, or by deglutition into the stomach. That part of these internal organs which first received the infection, must be affected in the same manner as the external part is by inoculation. But an eruption and inflammation, which affect the animal œconomy but little, if at all, when produced upon the skin of the arm or hand, must be of the utmost consequence when they take place in organs whose action is so necessary to life. Their influence extends over all other parts, and they are of such a nature, that an inflammation upon the

least spot of them often brings on an universal inflammation of the whole.

The symptoms of the small-pox, when it is violent, indicate that the seat is in the stomach or lungs; and dissection constantly shews the cause of death to have been an eruption in these *viscera*, like that which appears outwardly.

An eruption and inflammation, though ever so slight, either in the lungs or stomach, must produce effects, which being combined with those of the *virus*, will in this first period render the disorder inflammatory, which it could not otherwise have been. Accordingly, in the natural small-pox, so early as the second or third day of the fever, the pulse, heat, &c. indicate an internal inflammation, and the blood is fizy as it is in inflammations of the lungs. But in the artificial small-pox, as the local inflammation is always slight, especially if the insertion has been well performed, and as it does not affect a delicate organ essential to life, it may be considered as next to nothing; and consequently the fever, and other symptoms incident to this period, are only occasioned by the immediate and hidden working of the venom, without the intervention of other causes. Hence we observe, during this stage of inoculation, none of those inflammatory symptoms which seldom fail to show themselves in the natural disorder.

Having

Having now explained the nature and difference of these two last stages, which are properly the small-pox, I shall proceed to the treatment; and begin by the rules to be observed during the first, viz. from the appearance of the fever to the eruption. These rules are the more important, as the two periods always correspond. It is universally allowed, that the higher the fever is, the fuller the eruption will be. When that once appears, it must have its course; the business of art is therefore to check it beforehand, by endeavouring to mitigate the disorder in the first stage, whence depends the degree of it in the second.

Our rules are simple, easy, and equally applicable to the natural and artificial small-pox.

R U L E

R U L E I. *Fresh and cool air is to be respired.*

T H E least attention to the phenomena of this disorder will convince us, that its process tends to assimilate part of our liquids to the primary variolous atom applied to any part of the body, either by inoculation or natural contagion. The result of this process is an eruption, the matter of which is exactly like that of the first applied atom. The reproduction therefore, and the multiplication of this atom, or the assimilation of our humors with the variolous matter, constitute the essence of this disorder.

Now, as the whole danger is known to consist in this assimilation, or in the quantity of pustules ; the object of the treatment ought to be the reducing of it. The free admission of cool air fully answers this purpose ; for as heat is the most powerful and universal agent in nature in propagation, vegetation, fermentation, and in general in every process where one substance is to be converted into another ; so cold must check and retard the assimilation of our humors with the variolous matter, as it checks the growth of a plant, or the fermentation of a body.

Other reasons might be alledged to explain the salutary effects of cool air in this disorder ;

disorder * ; but reasonings are needless, where experience is so sure a guide.

In all countries, and at all times, it has been found that cool air is the most powerful antidote against this disorder ; and hot air, on the contrary, the chief cause of fatal accidents too commonly observed in it.

I might quote the observations of the most famous physicians, who taught this doctrine, and to theirs join my own ; but it will be sufficient to appeal to Sydenham, that oracle in physic, especially with regard to the small-pox. Read the works of that great man, and you will find, that whenever he treats of this distemper, he insists upon the necessity of breathing fresh air. Compare his various writings, and even the several editions he published, and you will be sensible that he was led to this opinion, not by reasoning or prejudice, but by degrees, and a long train of experiments.

The best writers since his time have added but little to what he said ; but one and all confirmed his doctrine as to the benefit of fresh

* It might, for instance, be said, that of all the bodily organs, the nerves are most particularly attacked in this disorder, and that cold is the most powerful specific in all nervous affections. This begins to be understood in some parts of Europe, and will be more so in time, as the weakness of these organs seems daily to increase in the polished part of the human species.

air.

air. Some indeed went farther and asserted that the cooler the air, the better it is. They were induced to think so from some desperate cases in the small-pox, where the patient, thought to be dead, revived upon being exposed to the cold and open air, in the depth of winter.

The great success of inoculation in some parts of England, for these two or three last years, is by several eminent physicians ascribed chiefly to the courage of inoculators, who have ventured farther than Sydenham himself; and the event seems to warrant even excess in this article. Of this the following fact, related by professor Monro, is a sufficient proof. One hundred and twelve persons were inoculated in the depth of winter, in some of the most northern islands of Scotland, where there was hardly fuel enough to dress victuals; several of the patients, during the whole course of the disorder, went out bare-footed upon the ice and snow, and not one of them died.

By quoting this instance of boldness, I do not pretend to advise the imitation of it; but this I dare affirm, with that assurance which intimate conviction alone can give, that every thing is to be feared from the heat of the air, and little or nothing from cold; that a physician may safely have recourse even to excess of cold in a confluent and dangerous small-pox; and that many a one who dies of the natural disorder, after having been thoroughly nursed and covered up in bed in a hot and close room, would have escaped, had he been so lucky as
to

to be seized with it in the open fields, and had crept into the meanest hut, which could hardly afford a shelter from the inclemency of the winter.

What I have now been saying relates to the natural, rather than to the artificial small-pox. This last is so mild of itself, that, when nothing is done to render it dangerous, seemingly harsh means need never be used. I only desire that every patient under inoculation avoid both excesses of heat and cold; that they breathe a cool air; and that their own sensations be the measure of this temperature. Let them act in this respect as if they were in health, and consulted their conveniency alone in the choice of their air. The heat of their body, increased by the disorder, will, it is true, encrease their desire of cool air; and such a degree of cold as would be rather disagreeable in health, will be extremely grateful in the small-pox. But this very desire is the voice of nature, and the relief, which immediately follows the gratifying of it, shews that this voice is not deceitful.

I cannot help observing, that every physician must know this to be the doctrine of Sydenham, Boerhaave, and all the great masters of our art. Not one of them would dare to avow the contrary opinion in print; and yet how many suffer their patients to be stifled up in hot rooms, and debarred from the benefit of cool air, merely in compliance with vulgar prejudice, founded on a mistaken notion that heat drives the humors toward the skin, that cold repels them, and consequently that warmth
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is beneficial, and cold hurtful in the small-pox?

Now, though this popular error can have no abettors among physicians, yet, lest any should inadvertently be led astray, it may be worth our while to refute it.

1. It is contradicted by experience, which is above all reasonings.

2. It rests upon vague and confused notions, and falls to the ground as soon as we come to a definition of the words used to express it.

3. The hot air taken in by the breath is so far from driving the humors outward, that it rather carries them more forcibly to the internal parts, and especially to the lungs, by dilating the pulmonary blood-vessels; whereas cold contracts the diameter of those trunks, and forces the humors towards the external parts.

4. When the eruption is compleated, and the pustules have once appeared, the cold surrounding air of the atmospheres never strikes them in. This has been observed by many physicians, and may be so by all, as well as by myself. On the contrary, the eruption is always most copious in those parts, which are most exposed to the air, viz. the face and hands, even in the coldest weather.

5. If

5. If cold did really drive back the pustules, it would be an advantage in a disorder, where the danger arises from their number. Hence, in some cases, pustules are often seen to disappear soon after the eruption; and this phenomenon, when attended with no bad symptom, is looked upon by skilful physicians as a sign that the disorder is very slight.

6. What induces people to imagine that pustules which disappear do really strike in, and that the humor which was to have filled them, is driven back towards the internal parts, and brings on the terrible symptoms sometimes attending this disorder, and even death itself, is, that the vanishing of the pustules is often the consequence of a fatal turn of the distemper. But the effect is here mistaken for the cause. When life is immediately attacked by some internal enemy, such as an eruption on the lungs or stomach, too great an inflammation of these parts, too copious a suppuration, a mortification, &c. nature, sinking under this attack, is unable to carry on the external eruption, and the pustules disappear of course. But the threatening symptoms always go before; and the dissection of the bodies after death shews that the causes, which brought it on, began long before the sinking of the pustules.

In any other distemper, the discharge of an issue, of a blister, of a wound, or of an ulcer stops, when death draws near. We might just as well say, that the suppression of this discharge was the cause of death, as that the striking in of the pustules is so in the small-pox.

How absurd then is the doctrine which these few observations overthrow; but to how many thousands has it not proved fatal!

R U L E

R U L E II. *The patient's mind must be diverted as much as possible.*

STRANGE as this rule may appear, it is of the utmost importance. We all know what influence the affections of the soul have upon the disorders of the body; and in none is this so conspicuous as in the small-pox. From the apprehensions of the patient, his fate is often pronounced; hence great care is commonly taken to conceal from him the nature of his ailment; and many people decline inoculation, from a persuasion that they should not be terrified by the natural small-pox; so well is every one convinced that fear constitutes the greatest danger of this disorder.

If we examine things narrowly, and analyse the sensations of the mind in the first period, we shall find some other feelings, which cannot come under the denomination of fear. A dejection will be observed, a sadness, an uneasiness and anxiety; these symptoms more or less apparent, seem to indicate that the active principle which presides over our preservation, is threatened with some imminent danger, and as it were feels the presence and influence of a cause ready to attack health and life in a manner the more alarming, as it shews itself less by external signs. Indeed as to the pain, or heat, the hardness or quickness of the pulse, by which we commonly judge of the intenseness of other disorders, they are very far from keeping pace with the lowness of spirits, weariness and uneasiness, so often observable in this.

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Now

Now these symptoms, and their disproportion with the former, are the principal signs of pestilential distempers, among which the small-pox may be ranked ; and it is chiefly by this difference that a skilful physician presently distinguishes the variolous fever from all others. May it not, at the same time, afford an additional proof, that all these disorders have their seat in the nerves, which of all other organs are most immediately connected with the soul ?

The existence of these feelings being thus proved, our business must be to excite their opposites by means of amusement.

I was always struck with the resemblance of the earliest symptoms of this disorder with those of the sea-sickness. The anxiety, nausea, weariness, dejection, head-ach, are in both cases the same, and only differ in point of duration. It even happens sometimes, when a person is long and violently sick at sea, that some small degree of fever will appear at times, and the pulse shall be heavy and intermittent, as in the first period of the small-pox.

Sea-faring people know that dissipation is the best remedy for, and even a preservative against, these complaints. They advise such as are apt to be sick to keep upon deck, and to help in the working of the ship. I have many a time seen people violently sea-sick, instantly relieved by some strong impression on their mind. A ship passing by, the sight of land, any object that strikes unexpectedly, will in a moment perform a compleat cure.

Neither

Neither this comparison, however, nor all my preceding reasonings, would so strongly convince me of the truth and utility of the rule before us, as the facts which I have been witness to.

I have seen children in the first period, left to themselves in bed, suffering all the anxieties of this state; and at once have observed all their ills to vanish, as soon as their attention was drawn off to an amusing tale, or to a pleasing toy. This amendment was still more perfect if they were taken up, and enticed to walk about, to dance, to play, and if moderate exercise was added to the recreation of the mind. I aver that, whenever I have managed my inoculated patients in this manner, by keeping them out of bed, and contriving to divert and keep them in constant motion, they have slipped through this period, and hardly have known they were sick. I will not take upon me to determine whether this efficacy of exercise, during that period, is altogether owing to the diversion of the mind, to its increasing and facilitating the secretions, or to any other cause; but certain it is, that it constantly gives relief, and never has any bad effect.

It is easy to divert and amuse children; but how to manage with grown people, is by far a more difficult task. They require more interesting objects, and the choice can only be determined by the knowledge of their taste, and by particular circumstances. In general, one may recommend any moderate exercise attended with some diversion of the mind; such as

walking, riding, &c. I say attended with diversion; for a man, who only walks to comply with the prescription of his physician, will be much sooner tired than one who is upon a hunting-match.

General directions cannot be given on this subject; those who have the care of the patients, and the patients themselves, are the best judges of what is most proper in each particular case. By their prudent management, they will be astonished to see a disorder, which would have been severe, if the patient had been nursed and kept in bed, turn out a mere trifle.

Some of the inoculators, who have succeeded so wonderfully in various parts of England, make their patients walk out in the fields, as soon as the fever comes on; they oblige them to go themselves and pump the water they are to drink, and constantly expose them to the open air in all weathers and at all seasons, not only during the feverish, but throughout the eruptive, state.

The two rules here laid down, contain all that is material in the management of the first period. Fresh air and amusement will greatly alleviate the illness, and prevent all bad symptoms.

But to be still more explicit in an affair of such importance, I shall specify some farther directions, included in, and flowing from, the two foregoing rules.

1. *The cool air which is inspired ought, if possible, to be free, and constantly renewed.*

2. *The drink should be cool, and pleasant to the taste.* Cool, for the same reasons with the air; pleasant, to prevent the sickness and reachings so common in this disorder.

3. *The palate of the patient may in general be trusted to for the quantity and quality of the food.* The call of nature is a truer and safer guide than any directions. If the patient loaths his food, it is a sign he does not want it; if, on the other hand, his appetite should be but a false craving, he will soon be satisfied.

4. *The cloathing and bed-covering ought to be the same as in health.*

5. *The patient must not be allowed to lie in bed, except at the hours of sleep.*

These directions, which ought to be observed from the beginning of the fever to the end of the eruption, are dictated by nature, and confirmed by experience.

What does nature call for, by that inward heat, thirst, anxiety, retching, heaviness, lowness of spirits, uneasiness, which attend the first period? What; but free and open air, cool and pleasant liquors, entertaining objects, &c.?

Does not experience confirm the same thing? What set of men come off best in the small-

pox? The lower-class, undoubtedly; the poor country people, who, left to the care of nature, blindly follow her dictates.

Particular observations may be still more convincing; let any one therefore alternately follow our rules, and those which are commonly practised; and first try them upon the inoculated small-pox, as being so mild in itself, that some little errors in the management can hardly make it very dangerous or mortal.

But I would not be misunderstood. When I propose trying the rules commonly practised, I am far from meaning what is too often done in the natural small-pox, when, under the notion of *throwing out the variolous humour, driving it to the skin, drawing it down to the legs, removing it from the nobler parts, and easing the stomach* of those humours which occasion anxieties and retchings, the poor patient is covered up warm in bed, in a hot close room, vomited, bled, blistered, and plied with cordials, apozems, &c. This indeed would be enough to make even inoculation fatal. By common practice I mean that, which is generally followed by the wisest and most humane inoculators, and which consists in treating this disorder as they would any gentle fever of much the same duration, though of a different nature. A patient would in that case be kept in bed, in a room moderately warm; fed with broth, eggs, milk-porridge, and allowed any of the cooling and aperitive drinks.

Let

Let this method, I say, and mine be tried upon two different patients, and I will warrant the success of this double experiment to be such, that the latter will be thought preferable, even to the natural small-pox; and we shall shudder to think how much the ills that nature sends us may be aggravated by mismanagement, a worse evil than those which it pretends to cure.

Although the observance of the above rules may alone suffice to render the inoculated small-pox always mild and absolutely safe, yet I will not omit mentioning two helps, which art might afford to concur to the same end.

The first is the use of antispasmodics^(a), the efficacy of which has been experienced by the ablest practitioners, and I may say by myself. I have constantly found their effect to be easy, without any bad consequence. I observed that they might safely be given in larger doses in this distemper than in any other, or even in health; and their effect afforded me a farther demonstration, that the nerves are of all the organs the most affected in the small-pox. But these remedies must only be used in the first period, and not after the eruption.

The second expedient is new, and I only propose it as a hint deserving of farther experiments.

(^a) I could have wished our author had specified what antispasmodics he meant.

By a constant law of nature, the local eruption at the place of insertion breaks out at least three days before the fever; and the later the fever comes on, the milder the disorder will generally be. Hence I concluded that the cause, which immediately acted upon the whole of the animal system, was by no means the matter which had been inserted, but that which was contained in the pustules of the first eruption. I therefore thought, that if any means could be contrived to retard the action of this matter, the disorder might prove flightier, and that cold applied to these pustules might answer this purpose.

Accordingly I desired two of my patients inoculated in the hand, to hold it in cold water as often and as long as possible, from the first appearances of the local eruption to that of the fever. In both cases the fever came on; but only the sixth day after, it was hardly perceptible, and lasted but four or five hours.

I am sensible that two facts are not sufficient to establish a general rule; as other causes may have influenced the event. But by repeating and varying this experiment, useful discoveries may be made, and more attention will be paid to this topical eruption, and its relation with the general one.

Be that as it will, an inoculated patient, treated according to the foregoing rules, during the first period, will have hardly any fever in
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the next, and certainly a very slight eruption, and perhaps none at all.

In the first case, the inflammation and suppuration of a few pustules will not sensibly affect the animal œconomy, nor bring on the suppurative fever, which is the necessary consequence of a large crop, nor any of those dreadful symptoms, which attend the confluent sort. In short, the second period will be no illness at all; the patient is quite well as soon as the eruption appears.

He is surely no less so in the second case, when there is no general eruption; for the variolous infection having spent itself in the pustules that first came out at the place of insertion, these can no longer act upon the rest of the body, but are a sure sign that inoculation has produced its whole effect.

It has indeed been questioned, whether a patient who had but very few pustules, or only one, has had the small-pox as truly as one who has been very full, and whether he is equally safe from catching it.

He certainly had it, since the characteristic of the small-pox, that from which it is denominated in all languages, and by which it is distinguished from all other diseases, is the variolous eruption, not the number of pustules. He is equally safe from a return; for no reason can be alledged why we should have the small-pox but once, that will not equally hold good for one as for ten thousand pustules.

The

The instances, true or false, of a return are given out as having happened after a severe, as well as after a slight, small-pox. If a single pustule is no security, why should two, or a hundred? Or how many will be requisite? Were the probability of being safe from catching the small-pox again proportioned to the quantity of the eruption, inoculation, together with the rules given for the management of it, would be highly absurd; since both the rules and the practice, being intended to lessen the crop, would thereby tend to lessen the probability of never having it again.

A more palpable argument of this truth may be drawn from the very nature and course of the disorder. The inoculated small-pox is the ultimate effect of the variolous particle, which was applied to the skin. Now he, who has one pustule, undergoes an application to his skin of all the matter contained in the pustule; he is, in effect, inoculated on the spot, where the pustule is, and that much more powerfully than by the bare insertion of the atom of matter. The contents of this pustule being derived from the patient's own body, are more intimately united to it, in greater quantity, and for a longer time, than the particle inserted by inoculation. If therefore a subject, after having once undergone the action of the variolous atom, was still liable to a fresh infection, his own pustule would inoculate him; this second infection would bring forth a third; and this a fourth; and so on, till he had exhausted the whole stock, or fell a victim to such a load of infection.

A man

A man covered with variolous pustules, has all over his body a *stratum* of the very same matter, an atom of which gave him the small-pox a few days before, and the smallest particle of which will inoculate another, if applied to his skin, or, if conveyed with the air into his lungs, may give him a mortal small-pox. Yet this man, so thoroughly coated with the venom, finds no alteration in his health when the suppuration is over, but what proceeds from his past illness; and the matter he is still covered with has no farther power over him.

Suppose a body of such a nature as to be set on fire by a single spark; if, after having seen it in a blaze, you should observe it surrounded with flames, yet neither burnt nor so much as heated by them, would you not say that it is become *incombustible*? In like manner, when you have seen the smallest variolous atom, by its bare application, infecting a human body, and afterwards behold the same body covered with the same kind of matter, and not in the least affected by it, will you not conclude that it is no longer susceptible of infection, and, if I may so say, that it is become *invariola*ble?

This property of the variolous matter so active the first time it is applied to a human body, and so inert as to the same body, when it has produced its effect, and been propagated and multiplied, ought always to be kept in view, if we would understand any thing of the hitherto unknown nature of this strange disorder.

This

This indeed is not our present object; and it may suffice for our purpose to conclude, that whoever has one pock is in the same case with one that has a full crop; each has had his share; and if the disorder can attack the same subject but once, both will for ever remain equally free.

But notwithstanding the obviousness of this truth, many people, accustomed to judge more from their own argumentations than from facts, will hardly be brought to believe that one pustule has the same effect as ten thousand. Though approves of inoculation in general, the bulk of mankind will be afraid of a copious eruption, and uneasy after a sparing one.

In order to satisfy these, it were to be wished, that inoculation could be so managed as to procure an eruption sufficient to remove all apprehensions of a return, and yet so moderate as not to endanger the patient.

The rules, which I have laid down, are intended to lessen the number of pustules; those which I have been opposing, tend to increase it. If two subjects presented themselves alike in health and disposition, I am apt to think one might engage to give the one but few pustules, perhaps but one, and to the other a very full crop, if not a confluent small-pox.

In order to produce an eruption neither too small nor too great, a middle course should be steered between the two methods. But it is no easy matter to find out this middle way; nor
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can any exact rule be prescribed, so as neither to go beyond, nor fall short of, the mark. By keeping to the usual way of preparing, or of inserting, or of treating, or else to all three, the operator may bring on more pustules than the patient would have had, if left to nature; but then he may possibly raise a fuller crop than he wished for, perhaps something worse; and on the other hand, some patients may chance to be so well disposed by nature, that in spite of physical art they may have no small-pox, but at the place of insertion.

If one was absolutely bent upon giving a certain number of pustules, I could propose one way, though I must own I would not do it myself, and that is, to make the insertion with a needle, in twenty, thirty, or fifty places; then you would be sure of one pustule at least at each puncture, and probably of many more in other parts.

This method is the least dangerous I can think of, in compliance with common prejudice; but for my part, I cannot think a physician, merely to humour his patients, is at liberty to do them more harm than is necessary; and they, who will act at that rate, are less scrupulous than myself.

To be serious; I am satisfied that, notwithstanding the doubts which may arise as to the sufficiency of a single pustule, every wise man will run the venture of this inconveniency, and embrace the method here laid down. He can but be inoculated again, if he has any scruples; and

and by this experiment, he will find that one pustule is a sufficient security against any new infection, as has appeared in England, where this trial has often been made.

Again it may be asked, whether one can, indeed, have the small-pox but once? This question has been much canvassed, and perhaps not yet fully decided; but its being a matter of debate, shews that the case of a relapse, if real, is exceedingly rare; and those who pretend to say that it is frequent, and yet make no scruple of exposing themselves to the infection, either say what they do not think, or do not think of what they say. For my own part I declare, I have never seen a true small-pox twice in the same person; and were it true that a very small number of people are liable to catch it again, I still believe that inoculation, rightly managed, would preserve the far greater part of those who fall victims to the natural small-pox, and consequently must be judged a most important discovery for the good of mankind.

C O N C L U S I O N.

IN order to fulfil my plan, I shall briefly sum up the few propositions, which, in my opinion, contain the whole doctrine of inoculation, and offer some general observations upon the whole.

From what has been said, it appears that the best method, and consequently the whole practical art, of inoculation consists in these three things; 1. the choice of a healthy subject; 2. the applying to the skin, under the cuticle, a well chosen variolous atom; 3. fresh air and amusement.

This method is natural, simple, easy, convenient, and safe. Natural, both as it springs from the very nature of the small-pox, and as it readily occurs to every sensible and unprejudiced person. Hence it was practised by those barbarous people, who, for aught we know, were the inventors of inoculation; and by tender fearful mothers, who were desirous of preserving their children from a cruel distemper, by hurting them as little as possible.

It is simple; for what can be more so than a method, which prescribes but three rules, and these so plain as to be easily understood by every one?

Easy

Easy it certainly is, since a woman, a mother, a nurse, can practise it as well as the best physician. Who is a better judge than the mother, of her child's health? who more dexterous in performing the operation? who less likely to frighten the child, or more fit to divert it?

How convenient must that method be, which requires no confinement either before or after the disorder, if a slight indisposition can be called so, which lasts but three or four days at most, and requires no assistance from art, no operator, no expence?

Lastly, it is safe, both as it has been constantly successful, when and wherever practised, and as the few miscarriages of inoculation have been owing to a deviation from it.

Other methods have been invented. These were the result of much thinking; they require no small degree of attention and sagacity to comprehend them, can only be practised by skilful persons, are tedious, and require much care and patience; they not unfrequently render the distemper severe, or even mortal, add other needless disorders to the small-pox, and often leave troublesome, and sometimes dangerous, remains.

From this comparison between a simple, easy, and safe method, with those complicated, difficult, and unsafe practices, who can hesitate upon the choice?

Inoculation

Inoculation never will become universal, unless it has that simplicity, that ease, and above all, that safety, which it can acquire by no other method than ours. Methinks the advocates for the practice should have been aware that, till it is quite safe, it can never become general; and all computations to shew that a lesser risk ought to be incurred rather than a greater, will be found of little weight with the multitude. Mankind will always be more affected by a present danger, though exceedingly small, than by a much greater one, if remote, and in some degree uncertain.

But if inoculation can be brought to be absolutely safe, and the disorder to be constantly mild, and only an indisposition, the practice will be cleared of all the imputations it has lain under, and must become universal.

As truth finally triumphs over error, I am in hopes that the method, which I have been recommending, will one day be the general and settled one; and 'it will then be matter of wonder how it came to be so long unknown, or neglected, when known.

The time will come when health will not be impaired, under pretence of preparing one that is already well; when fores will no longer be made at the place of insertion, to give a vent to the variolous matter; and when the disorder will not be made worse by the usual helps intended

tended to cure it. Then, I repeat it, inoculation will no longer be charged with the mischiefs done by injudicious preparation, infection, and treatment.

F I N I S.

A N
A C C O U N T
O F A
SERIES of EXPERIMENTS,
Instituted with a View of ascertaining the
MOST SUCCESSFUL METHOD
O F
INOCULATING THE SMALL-POX.

By WILLIAM WATSON, M. D.

Fellow of the Royal Society, one of the Trustees of the
British Museum, and Member of the Royal College of
Physicians.

Ἡ Πείρα ἔσφαλέρη.

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M DCC LXVIII.

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1. *Phragmites* (1990)

1. The first step in the process is to identify the problem. This involves gathering information about the situation and understanding the needs of the stakeholders involved.

[illegible]

1. *Chlorophyll a* and *Chlorophyll b* were determined by the method of Arar and Collins (1971) using a Shimadzu 1010 spectrophotometer. The concentration of chlorophyll was expressed in $\mu\text{g mL}^{-1}$ of the sample.

[illegible]

1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78. 79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94. 95. 96. 97. 98. 99. 100. 101. 102. 103. 104. 105. 106. 107. 108. 109. 110. 111. 112. 113. 114. 115. 116. 117. 118. 119. 120. 121. 122. 123. 124. 125. 126. 127. 128. 129. 130. 131. 132. 133. 134. 135. 136. 137. 138. 139. 140. 141. 142. 143. 144. 145. 146. 147. 148. 149. 150. 151. 152. 153. 154. 155. 156. 157. 158. 159. 160. 161. 162. 163. 164. 165. 166. 167. 168. 169. 170. 171. 172. 173. 174. 175. 176. 177. 178. 179. 180. 181. 182. 183. 184. 185. 186. 187. 188. 189. 190. 191. 192. 193. 194. 195. 196. 197. 198. 199. 200. 201. 202. 203. 204. 205. 206. 207. 208. 209. 210. 211. 212. 213. 214. 215. 216. 217. 218. 219. 220. 221. 222. 223. 224. 225. 226. 227. 228. 229. 230. 231. 232. 233. 234. 235. 236. 237. 238. 239. 240. 241. 242. 243. 244. 245. 246. 247. 248. 249. 250. 251. 252. 253. 254. 255. 256. 257. 258. 259. 260. 261. 262. 263. 264. 265. 266. 267. 268. 269. 270. 271. 272. 273. 274. 275. 276. 277. 278. 279. 280. 281. 282. 283. 284. 285. 286. 287. 288. 289. 290. 291. 292. 293. 294. 295. 296. 297. 298. 299. 300. 301. 302. 303. 304. 305. 306. 307. 308. 309. 310. 311. 312. 313. 314. 315. 316. 317. 318. 319. 320. 321. 322. 323. 324. 325. 326. 327. 328. 329. 330. 331. 332. 333. 334. 335. 336. 337. 338. 339. 340. 341. 342. 343. 344. 345. 346. 347. 348. 349. 350. 351. 352. 353. 354. 355. 356. 357. 358. 359. 360. 361. 362. 363. 364. 365. 366. 367. 368. 369. 370. 371. 372. 373. 374. 375. 376. 377. 378. 379. 380. 381. 382. 383. 384. 385. 386. 387. 388. 389. 390. 391. 392. 393. 394. 395. 396. 397. 398. 399. 400. 401. 402. 403. 404. 405. 406. 407. 408. 409. 410. 411. 412. 413. 414. 415. 416. 417. 418. 419. 420. 421. 422. 423. 424. 425. 426. 427. 428. 429. 430. 431. 432. 433. 434. 435. 436. 437. 438. 439. 440. 441. 442. 443. 444. 445. 446. 447. 448. 449. 450. 451. 452. 453. 454. 455. 456. 457. 458. 459. 460. 461. 462. 463. 464. 465. 466. 467. 468. 469. 470. 471. 472. 473. 474. 475. 476. 477. 478. 479. 480. 481. 482. 483. 484. 485. 486. 487. 488. 489. 490. 491. 492. 493. 494. 495. 496. 497. 498. 499. 500. 501. 502. 503. 504. 505. 506. 507. 508. 509. 510. 511. 512. 513. 514. 515. 516. 517. 518. 519. 520. 521. 522. 523. 524. 525. 526. 527. 528. 529. 530. 531. 532. 533. 534. 535. 536. 537. 538. 539. 540. 541. 542. 543. 544. 545. 546. 547. 548. 549. 550. 551. 552. 553. 554. 555. 556. 557. 558. 559. 560. 561. 562. 563. 564. 565. 566. 567. 568. 569. 570. 571. 572. 573. 574. 575. 576. 577. 578. 579. 580. 581. 582. 583. 584. 585. 586. 587. 588. 589. 590. 591. 592. 593. 594. 595. 596. 597. 598. 599. 600. 601. 602. 603. 604. 605. 606. 607. 608. 609. 610. 611. 612. 613. 614. 615. 616. 617. 618. 619. 620. 621. 622. 623. 624. 625. 626. 627. 628. 629. 630. 631. 632. 633. 634. 635. 636. 637. 638. 639. 640. 641. 642. 643. 644. 645. 646. 647. 648. 649. 650. 651. 652. 653. 654. 655. 656. 657. 658. 659. 660. 661. 662. 663. 664. 665. 666. 667. 668. 669. 670. 671. 672. 673. 674. 675. 676. 677. 678. 679. 680. 681. 682. 683. 684. 685. 686. 687. 688. 689. 690. 691. 692. 693. 694. 695. 696. 697. 698. 699. 700. 701. 702. 703. 704. 705. 706. 707. 708. 709. 710. 711. 712. 713. 714. 715. 716. 717. 718. 719. 720. 721. 722. 723. 724. 725. 726. 727. 728. 729. 730. 731. 732. 733. 734. 735. 736. 737. 738. 739. 740. 741. 742. 743. 744. 745. 746. 747. 748. 749. 750. 751. 752. 753. 754. 755. 756. 757. 758. 759. 760. 761. 762. 763. 764. 765. 766. 767. 768. 769. 770. 771. 772. 773. 774. 775. 776. 777. 778. 779. 780. 781. 782. 783. 784. 785. 786. 787. 788. 789. 790. 791. 792. 793. 794. 795. 796. 797. 798. 799. 800. 801. 802. 803. 804. 805. 806. 807. 808. 809. 810. 811. 812. 813. 814. 815. 816. 817. 818. 819. 820. 821. 822. 823. 824. 825. 826. 827. 828. 829. 830. 831. 832. 833. 834. 835. 836. 837. 838. 839. 840. 84

INTRODUCTION.

THE following sheets were originally intended to be communicated, either to the Royal Society, as papers upon inoculation have been published in the Philosophical Transactions, ever since that practice has been introduced into Great-Britain; or to the Society of Physicians in London, who have already published three volumes of *Medical Observations and Inquiries*: but as they exceeded the bounds usually allowed to a single production in those works, it was thought advisable to lay them before the public separately.

A N
A C C O U N T
O F A
S E R I E S of E X P E R I M E N T S
I N
I N O C U L A T I O N.

HAVING for several years been one of the physicians of the Foundling Hospital, where all the children are directed to be inoculated ; and where inoculation, under the conduct and direction of the physicians, has been practised ever since its establishment ; and being therefore in a situation of superintending every year the inoculation of some hundreds, I have given no small degree of attention to this mode of introducing the small-pox.

The success of inoculation at the hospital has been such, as no practitioners need be ashamed of. Very great success has likewise attended inoculation in many parts of this kingdom : even though it has of late descended into very

illiberal * hands; such as, in other diseases, scarce any one would dare to confide in. But among these last, I do not mean to include a certain family, who have practised inoculation with great success. They have deserved well; not only on account of some real improvements they have made in this process, but also for the confidence they have excited in the public, from which vast numbers have been inoculated, who otherwise would not.

Some inoculators depend, or at least seem to depend, upon the effect of certain nostrums, the composition of which they endeavour industriously to conceal. These consist chiefly of a mercurial preparation, given before and after the punctures are made; purging pills, and some doses of purging salts. They chuse the matter should be inserted in its ichorous or watery state. The medicines just now mentioned, with abstinence from animal food and heating liquors, a strict vegetable diet, not lying in bed more than usual, and cool and open air, constitute the chief part of their regimen, in most cases, during the preparation and course of the disease.

A practitioner in the west of England, besides preparing his patients, by bleeding some, and purging all, directs them to lie in bed and sweat freely, during the eruptive state of the disease, and until the eruption is complete.

* A livery-servant, belonging to a friend of the author's, left his master's service, not a great while since, to practise inoculation.

They

They are then permitted to walk about at large, and are under very little confinement during the remainder of the distemper.

A very ingenious and eminent physician, who has long practised inoculation largely with great success, and has published a valuable treatise upon this subject, directs both antimonial and mercurial medicines, during the preparation. He recommends that the variolous matter be inserted in its crude state; but he has informed me, since the publication of this work, that his doubts then remained, whether much depended upon the condition of the matter, at the time of inoculation.

I was very desirous of knowing what it was, in the whole regimen, that chiefly contributed to lessen the disease; particularly, what share the kind of variolous matter had in the success: whether it depended upon its being taken from the natural or inoculated small-pox; and then, whether in its watery, or in its purulent state. It would be a desirable thing likewise, when the variolous matter inserted and every other circumstance was the same, to observe what effect mercurial medicines or purges had, when given preparatory. Nothing hitherto had been done in a comparative view, which, while practitioners continue in the same track, cannot be expected. An investigation of this sort therefore, which very few physicians are in a situation of making, I considered as of no small importance. I resolved, therefore, to put in practice several of the methods that had been used with success, together
with

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with some others which promised to be equally secure; to the end that if any one method was by experience found to answer better than the others, it might be adopted.

I had found, though the same preparation I had used for several years was continued, yet that keeping the patients less in bed, and more exposed to the cool and open air, the disease was less severe; the variolous pustules were fewer in number, insomuch that they were very rarely blind: to say nothing, that at the end of the distemper they were less enfeebled. I determined to try, therefore, what medicines of different kinds, under the same regimen, would produce: besides, as lord Bacon suggests, *Inveniendum est, quid natura faciat, vel ferat*: It was proper also to be informed of what nature unassisted, not to say undisturbed, would do for herself. This was not to be done, but where a number of persons of both sexes were inoculated at the same time and place, in the same manner, with the same variolous matter, and observing equally the same regimen. The only difference then was to consist in their medical treatment.

October 12, 1767, I directed thirty-one persons to be inoculated. Their ages, as well as those of the subsequent observations, were from six to eleven or twelve. Ten were girls, and twenty-one boys. They were all inoculated with variolous matter, taken in its ichorous or watery state, from a person who had the disease in what is called the natural way. Each had two slight punctures in the left arm, made
with

with the point of a lancet, dipped in, and slightly moistened with, this matter; and no plaster was put over them. The lancet, in making these punctures, was obliquely directed, that the matter might be inserted between the cuticle and skin. They had all abstained from animal food ten days before the punctures were made, which they did likewise during the course of the disease. Their diet was milk, and divers preparations of vegetables; and their drink water, with toasted bread in it, except now and then a draught of wine whey, when necessary. If any of them coughed to a degree worth taking notice of, they drank infusion of raisins. When the weather was favourable, they were, both during the preparation and course of the disease, frequently in the open air. Hitherto in every particular the treatment was the same; if therefore, any difference should arise during the course of the subsequent disease, it must be accidental or constitutional, and not owing to diet or difference in their general regimen.

Of these thirty-one persons, five boys and five girls, by way of preparation, took a powder, consisting of twelve grains of jalap and four of calomel. This powder was taken twice before the insertion of the variolous matter, and once after. No other medicine was used as preparatory.

Of the five boys, four had the small-pox in a very slight degree; of the fifth, the punctures inflamed but little; and though he was inoculated a second time twelve days after, he had
no

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no eruption. The second punctures continued red several days; but neither sickness nor pustules succeeded. One only of these boys was in the least disordered during the whole course of the disease, and he complained of the head-ach, for a day or two preceding the eruption. These boys had only fifty-four pustules among them; about fourteen each.

Of the five girls, four had the eruption without any previous or attendant disorder. The punctures of the fifth inflamed, and had large red margins; an argument of the contagion having taken place; and were succeeded by only two pustules, which were so very small, and dried away on the second day after their appearance, that I could not depend upon them as variolous. She was therefore sixteen days after inoculated again; but these punctures healed very soon, and nothing succeeded. The four girls had only eighteen pustules among them; not five to each.

The most that any boy had was twenty-five, the least had four. The most that any girl had was six, the least had three.

It must here be observed, that in this and the subsequent account, the pustules were numbered by the attendants when they were nearest maturity, in every part of the body, the scalp excepted; where, on account of the hair, their number could not be ascertained. The pustules arising from the punctures and about them were never reckoned among the others.

Five boys and five girls under the same regimen with the former, took each of them two purges of infusion of senna and syrup of roses, before the punctures were made, and one four days after. No other medicine was used as preparatory. Not one of these complained of sickness, or other disorder, during the whole course of the disease. Eight of them had various pustules. One of the girls, though the punctures inflamed, had no eruption. She was then inoculated again, but the second punctures were not visible after a day or two. One of the boys had likewise the punctures inflamed to a considerable degree, but no eruption followed. These eight had sixty-six pustules among them, of whom one, who had most, had thirty. Two of the girls had only two pustules each. At a medium, each had little more than eight pustules.

Eleven boys under the same circumstances with the former, were inoculated without any medical preparation. Of these, previous to the eruption, five complained of head-ach, two of which were slightly feverish. One of these last, though the punctures inflamed, and had a large red margin round them two inches in diameter, had no eruption; and when punctured a second time, a fortnight after, it had no effect. Another, who had no feverish symptoms, though the punctures inflamed, had no eruption, and was inoculated a fortnight after without effect. The other nine went through the disease perfectly well, and had among them two hundred and eighty-eight pustules; which, reduced to a medium, is thirty-two each. It is here to be observed,

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served, that one of these had near two hundred pustules; and three of the others only seven among them.

Except three purges at the decline of the disease, and what was considered as preparatory, none of these thirty-one persons took any medicine during the course of it.

November 1, fourteen boys and nine girls were inoculated under the same continuance of vegetable diet, and abstinence from animal food as the former. Those before mentioned were inoculated with variolous matter, in its thin or ichorous state, from the pustules of the natural small-pox: but these were infected with purulent matter taken from the pustule of the inoculated small-pox. Of these, four boys and four girls took each of them thrice, as in the former inoculation, four grains of calomel without any addition: as it might be presumed that in the former manner of giving it, this mercurial preparation had not its full effect, on account of its being joined with, and carried off hastily by, a purging medicine; it was therefore left to itself, and it generally went off gently by stool. Each of these eight had variolous pustules. Three of the girls and one of the boys had a sickness and slight head-ach before the eruption; the last, during this sickness, voided five worms by stool. The number of pustules among the eight amounted to five hundred and seventy-six, viz. seventy-two to each. Of these, one girl had four hundred and forty pustules; but she was no otherwise disordered during the whole illness, than with a slight head-ach,

ach, without feverish heat, on the two days preceding the eruption. One boy had only seven pustules.

At the same time with the former, in the same manner, and with the same matter, four boys and four girls were inoculated. These took no mercurial preparation, but only two doses of infusion of senna and syrup of roses twice before the punctures were made, and once after. Of these eight, one boy only complained of an head-ach one day, which went off upon the eruption of the pustules. They all had variolous eruptions. The number among these eight amounted to two hundred and fifteen; nearly twenty-nine to each. Of these, that patient who had most, had sixty-four; the least three. One of these boys, who had eighteen pustules, after they were ripe and in a state of decline, had an imposthumation under his chin, which broke of itself, under a pultice of bread and milk, and healed in a few days. The above sixteen, as well those who took calomel during the preparation, as those who took the other purging physic, had also three doses of infusion of senna and syrup of roses when the disease was over. No other medicine was taken.

The remaining six boys and one girl, who were under the same circumstances likewise inoculated at this time, took no medicine, either preparatory, during the course of the disease, or after it; except their abstaining from animal food; they were treated in the manner recommended by the ingenious Dr. Gatti, who
sometime

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sometime since inoculated a considerable number at Paris, and whom I frequently saw while he was in London. Two of the boys complained of a slight head-ach the day before the eruption; they all had variolous pustules; and the number among them amounted to one hundred and twenty-five; not quite eighteen to each. He who had most, had sixty; the least, two: the girl had only three. Though none of these, as I before mentioned, took any purging medicine, at the decline, or after the disease; they, nevertheless, continued perfectly well. In about twenty days from the punctures being made, not to mention here that each puncture generally became a variolous pustule, and matured always before the rest, the external inflammation attendant on them had entirely subsided, and nothing remained on the punctured parts but a dry scale, which easily came off of itself.

I before mentioned, that in the first of the two above recited inoculations, the variolous matter was taken from the natural small-pox, when in a watery state: in the second, the matter made use of was from the inoculated small-pox, when purulent. On November 24, twenty were inoculated under the same circumstances of diet, cool air, and every thing else; the variolous matter was that from inoculation, and in its perfectly concocted state. It was taken from the inside of the hand of a strong hard-skinned boy, where two or three pustules remained after they were dry. The matter was perfectly white, and as viscid as cream. I was desirous of being informed, whether
the

the effects of this would be different from what had been first employed, either in the punctures or eruptions. Of this number, ten were boys, and ten girls. Fifteen of these had been twelve days without animal food, before the punctures were made; five were inoculated after only three days abstinence. They took no medicine, either preparatory, or during the course of the disease. Of these, one boy and one girl, though the punctures inflamed and were turgid, had no eruption; and when fresh punctures were made a fortnight after, they did not inflame, and were scarce visible the third day after they were made. The boy was one of those who had abstained three days only from animal food.

The other eighteen had variolous pustules. Five of the boys and two of the girls complained of head-ach and sickness of stomach before the eruption; the rest had no complaints. The number of pustules among them amounted to one thousand and twenty: not quite fifty-seven each. The greatest number either of them had was two hundred and sixty; the least had only two, exclusive of those occasioned by the punctures. Three had only four pustules each. He that had the greatest number, was not one of those who had been three days only from animal food. The pustules among these four amounted to two hundred and ninety-three; something more than seventy-three to each: though one of these had only four pustules. She who had most, had one hundred and sixty-eight.

The whole eighteen went through the disease without any thing worthy of remark, except one of the boys, who had been three days only kept from animal food. Though he had ninety-three pustules, he became somewhat feverish two days after the maturation of the pustules. This was followed by a painful inflammatory swelling upon the shoulder, which disappeared intirely in a few days, upon the application of a common pultice, and taking some purges of infusion of senna.

The punctures of all those in the former inoculation dried away, as I before mentioned, in a few days after the maturation of the pustules; though the patients, some of them, took no purging medicine after the decline of the disease: but in the last inoculation, where matter highly concocted was employed, in four of the boys and three of the girls, the punctures remained turgid and red, after the variolous pustules were dried away. To these, and to these only, some purges were given; during the taking of which, the punctures healed and scaled off. Neither of these, were of the number of those who had, prior to their being punctured, abstained three days only from animal food.

Of the seventy-four persons, whose histories I have here related, though inoculated with variolous matter in different states; though prepared in so different a manner; and a great many no otherwise prepared than by abstinence from animal food; not one of them was disordered enough, during the whole process, to occasion the least anxiety for the event.

Not

Not one of them had, from the pustules being upon the eyelids or near them, their eyes closed a single day; none continued in bed an hour longer than they would have been in their best health. None of them had any tumour under the armpit, much less an abscess there, which in the former method of inoculating was too often seen. No plaster was used to any of them, as I had long since found it to answer no other purpose than to disguise the appearance of the punctures. As in a few of them, half a dozen perhaps, the punctures spread, and were sore about the time, or soon after the maturation, a pul-tice of bread and milk, answered effectually every purpose of outward application.

When it did not rain, or the weather was otherwise unfit, they were out every day, during the whole process, in a field near the infirmary where they were inoculated, where no other persons were admitted.

There did not happen to any of these, what I have sometimes observed in delicate adults and weakly children when under inoculation, viz. that after the febrile state has been over, and the eruption been complete, by keeping the patient cool, and not permitting them to continue in bed, the pustules have not proceeded towards maturation, but seemed at a stand. At the same time, the patient has been languid, restless, and attended with frequent vomitings. Under these circumstances, confinement in bed, somewhat warmer than in health, appropriated cordial

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medicines, wine whey, and, occasionally, if the bowels are lax, an anodyne, have been of great use. From this alteration of treatment these symptoms have gone off, and the pustules have then ripened kindly. When cases of this sort occur, which do not frequently, it is obvious to a sagacious practitioner, what ought to be done.

The greatest number of pustules that, in the three inoculations, either of the boys had on his face, was twenty-seven: two had twenty each; all the rest under that number. The greatest number upon the face of either of the girls was forty; another had thirty; a third twenty-nine; none of the others had twenty, many none at all; far the greatest number, fewer than ten.

Of the twenty last inoculated, where no preparatory purges were given, and where matter highly concocted was inserted, it was strikingly observable, not only to myself, but to some experienced physicians and others, who did me the honour of attending me during the course of these inquiries, that the pustules were larger, and matured more perfectly than in the first inoculation. In both the former inoculations especially when either calomel or purges were given as preparatory, in many of the patients the matter scarce ripened perfectly; the pustules were small, watery and frequently dried away without maturing: but it must be remembered, whatever might be the more powerful effect of variolous concocted matter, that to these last were given no preparatory purges.

Upon

Upon reviewing what has been before laid down, it appears, that out of seventy-four, the whole sixty-two persons, who in consequence of inoculation had variolous pustules, had among them in number, two thousand three hundred and sixty-two; somewhat more than thirty-eight to each: an inconsiderable number indeed! as physicians daily see in one limb only of an adult person, labouring under the coherent, not to say confluent natural small-pox, a greater quantity of variolous matter than was found in all these persons put together.

The remaining twelve, though they had no eruption, I consider as having, in all probability gone through the disease; as the punctures of almost all of them were inflamed and turgid many days. When this happens, and no plaister has been applied, though neither febrile symptoms nor pustules supervene, it is an argument of the variolous matter having infected the punctures. If after these, other punctures are made without effect, the variolous poison seems to have exerted its utmost power in the former punctures; and the small pox is no longer to be dreaded.

But to return; of those inoculated with the ichor of the natural small-pox,

Pustules at a medium.

Four boys, prepared with jalap and calomel, had, at a medium, - - 14 each.

Of these, the boy who had most pustules had 25, the least 5,

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Pustules at a medium.

Four girls with the same, - - - 5 each.

Of these, the girl who had most had 6, the least 3.

Four boys and four girls with infusion of senna, - - - 8 each.

Of these, the greatest number were 30, the least 2; none of the rest had 10.

Eleven without medical preparation, - - - 32 each.

Of these, the most were 200, the least 1.

Inoculated with purulent variolous matter from
Inoculation.

Pustules at a medium.

Four boys and four girls with calomel only, - - - 72 each.

Of these, the most were 440, the least 7.

Four boys and four girls with infusion of senna, - - - 29 each.

Of these, the most were 64, the least 3.

Six boys and one girl without medical preparation, - - - 18 each.

Of these, the most were 60, the least 2.

With

With highly concocted matter from inoculation without medical preparation.

Pustules at a medium.

Nine boys and nine girls had, - - 57 each.

Of these, the most were 260, the least 1.

Of these, four were inoculated after three days abstinence only from animal food : these had, - - 73 each.

The greatest number was 168, the least 4.

The twelve, who, though inoculated the second time, had no eruption, continued with the others during the whole course, in order to observe whether they would be infected by the natural contagion ; but nothing ensued.

As the degree of violence in the small-pox is, *cæteris paribus*, as the number of pustules ; by these relations it appears, that the smallest number of pustules were produced, when the variolous matter in its ichorous or watery state was inserted by puncture, and the patient had taken previously purges, in which the mercurial preparation did not seem to contribute any thing to the lessening of the number of pustules ; as those, who took the infusion of senna, and no mercurial preparation, came off as well. The pustules of the eight who took jalap and calomel, amounted, at a medium, to nine and $\frac{1}{2}$ each ; of the eight who took infusion

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fusion of senna, the pustules, at a medium, were eight to each. One of the eleven boys, who, under the same circumstances, except previous purges, had two hundred pustules, raises the medium of the others to thirty-two each; though one of these had but one pustule, and the next greatest in number had only thirty-six.

Of those eight, where purulent matter from inoculation was inserted, and calomel without purging medicine previously given, one had four hundred and forty pustules; a quantity almost double to that of any one of the whole number, who are the subject of this enquiry. The next greatest is forty-two; the least only seven. Of these the medium is seventy-two; a number more than double that of those, who in the former inoculation took no preparatory purging medicine at all; and nine times as many as those, who in the former inoculation took infusion of senna only. This experiment, as far it extends, is not in favour of the mercurial alterative, previous to inoculation. The medium of those eight who took infusion of senna, is twenty-nine each; much less than half the preceding number: and of the seven inoculated without medical preparation, the medium is eighteen, that is, one-fourth of the number only of those who took the mercurial medicine.

Of the eighteen, where matter in its most concocted state from inoculation was inserted, and no medical preparatory given, the medium was fifty-seven to each; which is the highest number,

number, except those who had taken the mercurial medicine.

Of those who were inoculated with only three days abstinence from animal food, the medium of the four was seventy-three; which is one more to each than those who had taken the calomel. Of these, however, one had but four pustules.

I here must remark, that from many trials I had heretofore made, and from the relation of others highly worthy of credit, I had long entertained doubts of the efficacy of mercurials, quatenus mercurials, lessening the quantity, and consequently the danger of the small-pox. I mean, here, what is usually called the alterative property of mercurial medicines, and not what depends upon their purging quality.

Such is the state of the facts, from which every person is at liberty to make such deductions as he may think they will admit of. To me it appears, that after ten or twelve days abstinence from animal food and heating liquors, the person being in other respects in good health, it is of no very great importance with what kind of variolous matter he is inoculated; as in every one of the histories before mentioned, though the treatment was so different, the small-pox was so slight as scarce to deserve the name of a disease. It should seem, however, from the result of these enquiries, that after a few previous gentle purges, in which mercurial preparations have no part, and the variolous matter being inserted in its watery state, that the supervening eruptions will be

be fewest in number, and the disease the slightest. Ichorous or watery variolous matter, therefore, I should chuse to employ.

If, indeed, particularly in children, there should be symptoms which indicated worms or foul bowels, I should certainly direct calomel with jalap, or with whatever other purging medicine was exhibited, previous to inoculation: and this not so much with a view of lessening the number of variolous pustules, as that of more effectually clearing the bowels of their morbid contents.

The general expediency of repeated purging at the decline and after the disease, when conducted in this manner, seems to depend entirely upon the state of the punctures, the sores succeeding them, and other indications at the time. The secure side is that of gently, and not violent, purging. If no plaster has been applied, the punctures rarely give any trouble. Particular care must be taken likewise, that, after so long an abstinence from animal food, the patients be, when the pustules are dried away, restored to it by degrees. Those of the younger sort especially, as their appetites are generally pretty keen, if left to their own discretion, would eat too much: and whatever happens afterwards, though apparently the effect only of too hasty an ingurgitation of animal food, would be attributed to the remains of the variolous matter lurking in the habit, and not sufficiently carried off.

It should seem also, that when highly concocted variolous matter is inserted, the supervening pustules are larger, more in number, and mature the most perfectly ; and that the sores attendant upon the punctures are disposed to keep longer open.

We may deduce likewise, that in general far more than any previous preparation depends upon the patient's constitutional fitness for the reception of the variolous poison at the time of inoculation. This is evinced by the great latitude in the number of pustules of those, where the disease was produced, when the regimen, diet, physic, and variolous matter were precisely the same.

From what combination of causes may arise this constitutional fitness for receiving the variolous infection, is reserved for more acute physiologists than myself to determine.

It need not here be observed, that the small-pox, when the contagion is received in what is called the natural way, is frequently one of the most fatal diseases, that infect mankind. By what means the intensity of it is lessened, and the disease becomes milder by inoculation ; whether it arises from the variolous virus being absorbed by the lymphatics upon the surface of the body, and not received in the first instance either into the lungs by respiration, or with the saliva or aliment into the stomach, is not intended to be discussed in this place. By computation from our bills of mortality, at a medium, out of every thousand who die of all diseases

diseases put together, we find that about eighty are destroyed by the small-pox; a twelfth part and half of the whole number of deaths. Sometimes the proportion is higher, as in the last year 1767: it then amounted to a tenth part, and about one third *. In the year 1752, which is the highest comparative number † I find, it amounted to a fifth, and somewhat more than a half. Whatever art can do, therefore, to avert this destruction, to prevent a cruel death to many, and deformity to more, is of high importance. This, I flatter myself, inoculation, when practised more generally than even in England at present, particularly in the country, under proper political, as well as medical regulations, will in a great measure do: and of this the most essential parts seem to be, the insertion of ichorous variolous matter by small puncture; a well regulated vegetable diet before, and during the whole ‡ process of inoculation; and the avoiding of heated rooms and

| | | | | |
|---------------------------|---|---|---|-------|
| * The general deaths were | - | - | - | 22612 |
| By the small-pox | - | - | - | 2188 |

| | | | | | | |
|------------------|---|---|---|---|---|-------|
| † Died in 1752, | - | - | - | - | - | 20485 |
| By the small-pox | - | - | - | - | - | 3538 |

‡ This rule may now and then admit of an exception in weakly and delicate habits, in which, after the febrile process is over and the eruption well formed, if the patient is very languid, some light broth, and even a mouthfull or two of chicken, may be indulged with advantage; but this must be directed with caution.

heated

heated liquors, particularly in the inflammatory state of the disease. These, to me, appear the principal points. The boasted effects of the medical nostrums of several inoculators, at however an extravagant price the possessors may rate them, are, in my opinion, very little to be regarded. The preceding histories bear testimony that much is not wanted; and if these are not deemed sufficiently numerous, we have many hundreds more to produce in corroboration of that testimony. It is well known that no persons place much value upon nostrums in physic, except those, whose knowledge in medical matters lies in a very small compass. The most valuable nostrum of all, I apprehend, is not to do too much: and I say this from the conviction I have, of the mischiefs I have seen, and believed to be owing to the effect of mercurials, and too frequent preparatory and other purgings, administered too liberally by some inoculators, in delicate habits. These, therefore, a prudent practitioner may avoid, and direct those medicines only, the utility of which experience has justified.

I hold it as a truth, and I am not singular in my opinion, that inoculation, practised by any person whatever, in any manner yet devised, and at any time, carries with it, in general, less danger to the patient than the natural small-pox, under the direction of the most able and experienced physician. Whatever, therefore, can contribute to the perfection of this salutary practice, deserves the most serious enquiry. What has been the result of my experience, I here

94 SERIES OF EXPERIMENTS.

I here, without reserve, communicate to the public.

The small-pox, in its mild and distinct state, is seldom, except among persons of distinction, an object of the care of physicians in London, out of hospitals. They are most frequently consulted in the worst state of the worst kind of the disease; when it is of too considerable a magnitude to admit of much relief from the medical art; as it is well known, that the averting the danger attendant upon the maturation and decline of the small-pox, depends very much upon its treatment during the febrile and eruptive state of it. The vexations and discouragements which the excellent Sydenham met with, in his practice in the confluent small-pox, mortified him not a little, and occasioned him to say, in his letter * to Dr. Cole, *Quâ de causâ, accedente insuperabili τῶν πολλῶν prejudicio, bene mecum agi putarem, si nunquam deinceps ad variolis laborantes accerferer.*

Within these last ten years, there have died of the small-pox, in the compass of the bills of mortality only, twenty-three thousand three hundred and eight persons †. Had this number

* *Dissertatio Epistolaris ad Gulielmum Cole, M.D.*

† This number is almost double to that of the first ten years of the present century, though the general deaths at that period do not fall much short of those of the last ten years. There

ber been inoculated under advantageous circumstances, it will not be too much to say, that the thousands had been preserved, and a portion only of the fractional parts been destroyed by this disease. Of these, how many died under inoculation we are not informed. It were a desirable thing to be known. The deaths by inoculation ought to make a distinct article in the bills of mortality. In great numbers inoculated some will die, whoever may conduct the process : but as many inoculators endeavour industriously to conceal the deaths in this practice, and are desirous of attributing them to any cause rather than the small-pox, it would not be easy to procure the real numbers.

It may be no small degree of satisfaction to those who have been inoculated, and have had the small-pox in a very slight manner, to be informed, that besides those above mentioned, who were inoculated a second time without effect, I have had some scores punctured a second time, where there has been only one pustule ; or where without pustules the punctures

There died of the small-pox from 1701 to 1710, 12548 persons. This number is greatly enhanced by the number 3138 dying of the small-pox in the last of those years. In the year 1702, there died of this disease, only 311 ; though the general deaths were 19481.

General deaths from 1701 to 1710, 214611
from 1758 to 1767, 223497
have

have been turgid or inflamed, when no plaster has been applied. This was done, in order to ascertain the reality of the variolous poison having exerted all its power. In no one instance, within my cognifance, a fubfequent eruption has ever happened; nor have the punctures the fecond time put on the appearance they did at firft; but have always healed as fuch flight punctures ufually do, when no variolous matter has been inferted.

Notwithstanding what I have before advanced, I am no advocate for very early inoculation, where the contagion may be in great measure avoided, as in country places. I do not recommend it, until the body has acquired a certain degree of ftrength, and the diforders attending infancy are over. When I fay this, it is well known, that numbers have been inoculated fuccefffully in the earlieft time of their lives; but it is likewise as well known, that feveral have died at that period, where great attention has been paid to them, and no medical affiftance been wanting. I therefore in this ftate never advife it, except in cafes where there is high probability of the infants receiving it by contagion; and I am of opinion, as has been already mentioned, that inoculation at any time carries with it more fecurity than having the fmall-pox by natural contagion. A few months fince, where a child of three years old had the natural fmall-pox in a fevere manner, there was an infant of only feven weeks old. This the parents refufed to remove out of the houfe, though I much preffed them to it. They were determined, that this infant fhould take its chance from

from its brother's contagion. They had no objection to its being inoculated, as I thought that method the most secure. It was accordingly inoculated from its brother, and had about twenty pustules, and passed very well through the small-pox; though on the two days preceding the eruption it was considerably disordered, to the no small anxiety both of the parents and myself. If infants have but little of the disease, they go through it well; but if they have much, which no practitioner can assure himself they will not, their powers of life are scarce sufficient to struggle with it, and the conflict is dangerous. The assistance of the medical art, in this situation, extends not very far. After three years old, the danger of inoculating is but little. In several parts of London, and in populous manufacturing towns, where several families live in one house, when the contagion is prevalent, there then remains, in my opinion, no doubt of the expediency of inoculating even early; as the incurring some little degree of danger is justifiable, when a much greater is impending.

A P P E N D I X.

THE following event being in my opinion very extraordinary, and having a relation to the subject-matter of these papers, I think it highly deserving to be communicated to the public. In order to this I have prevailed upon Mr. Osborne, a worthy friend of mine, who for many years was a very reputable surgeon and apothecary at Clerkenwell, and who attended the person, the subject of this account, to recollect every particular worthy notice relating to it, which he has been so obliging as to do, and of which the following is the history.

Jane Brown, aged twenty-three, a poor young woman, was seized with the small-pox and committed to the care of a nurse who used to take in indigent persons under that disease, and lived not far from the New River at Islington. Though the small-pox were come out, she was still delirious; and the nurse being gone out upon some little affairs of her own, the patient, during this absence, got out of bed, ran through the garden, and threw herself into the New River. This was between twelve and one at noon, November 21, 1741.

She

She was first discovered floating on her face by an old man, who was accidentally passing by on the opposite side of the river. He went round as fast as he could to alarm the people at the nearest house, which was the Crown Ale-house, and which was at some distance from the river. How long she had been in this position is uncertain; but when she was taken out, and laid on the grass, there was not the least appearance of life.

This part of the New-River, though at Islington, being in the parish of Clerkenwell, notice was sent of this event from Islington, after much altercation which of the two parishes ought to be at the expence of burying her, to one of the overseers of the poor, who gave an order for the parish-bearers to bring her to the workhouse at St. James's Clerkenwell. Accordingly one William Stevens, the parish gravedigger, who is now alive and near eighty years old, and Thomas Bull, a parish-bearer, since dead, were sent for this purpose.

As they were bringing her in a coffin across the fields to Clerkenwell, Bull's foot, it being frosty weather, slipped from under him; and he not being able to recover himself, let her fall on the ground.

While they were lifting her up again on their shoulders, they fancied they heard a faint sort of groan, which was related to the people, when they brought her to the work-house. Here she was laid upon the lid of the parish coffin, under an open arch going into the infirmary, the usual repository

repository for the dead before interment. But while some people were looking on her with much attention, they discovered some little motion in her upper lip; and as this seemed to corroborate the former circumstance of her supposed groaning, the master of the work-house ordered her to be removed into one of the wards, and put to bed; and, besides, directed Mr. Osborne to be sent for. He went immediately, and found this poor creature extremely cold, and to all appearance dead. Her pulse was imperceptible, and her stomach much swelled. He saw some spots upon her face and breast of a livid colour; but these were then disregarded. This was between three and four o'clock; about three hours after she had thrown herself into the water.

Mr. Osborne first attempted her relief by pouring down her throat, at different times, a spoon-full of warm water well impregnated with spirit of hartshorn. She was smartly rubbed with coarse cloths, and rolled backwards and forwards upon her stomach and sides. While this was doing, an odd croaking noise was heard, and immediately followed by a sudden gust of wind and water. She was then instantly turned on her stomach with her head reclining over the side of the bed, in order to facilitate the discharge of water, which in this situation ran freely from her mouth on the floor.

When this was over, she was turned on her back, with her head raised a little. The distention of her stomach was quite abated. As
Mr.

Mr. Osborne had no other medicine with him than spirit of hartshorn, he boiled a little ginger sliced in some water, and after straining it, added thereto about an equal part of mountain wine. This whole time she was to all appearance dead.

Just as the ginger and wine, as just now mentioned, were got ready, Mr. Osborne and the people about her perceived a trembling motion in the under jaw. He then got down three or four spoonfulls of this warm mixture, and directed a flannel petticoat to be made hot, and laid over her stomach and bowels; not doubting but there were now some hopes. This had, in a short time, a particular effect, by creating a surprizing kind of rumbling in the stomach and bowels, which was succeeded by a powerful discharge of wind from her stomach. After this, she had a little motion in one arm. He got down more of the ginger and wine, and sent home for a mixture with Raleigh's confection, salt of hartshorn, and tincture of cardamoms.

It was now for the first time he began to discover a low creeping pulse; her stomach was a little warm, but her extremities were still cold. He ordered her limbs to be wrapped in warm flannel, and gave her three spoonfulls of the mixture with Raleigh's confection, and left her.

About eight in the evening, Mr. Osborne sent his servant to see her; she could then turn

herself in the bed, was grown much warmer, and had taken a little broth and some bread.

Early in the morning Mr. Osborne visited her, after having been informed by one of the nurses of the workhouse that she was alive, but was broke out all over; and that she was sure it was the small-pox. This indeed heightened his curiosity, as he was hitherto unapprized of her having that disease; and upon examination found the nurse's suggestions strictly true. She had a considerable number of small-pox all over her, but mostly in her face. They were of a small sort but perfectly distinct.

Her pulse was now finely raised; she had made a large quantity of limpid urine in the night, complained of being sore all over, and was so very hoarse, she could scarce be understood. He directed some pectoral drink, and continued the mixture with Raleigh's confection, omitting the salt of hartshorn.

The next day the pustules looked well: she had had some sleep in the night, and had drank plentifully of pectoral drink, panada, and such like. The hoarseness was better, and he found her sitting up in bed. He visited her every day, and on the fourth the pustules began to suppurate kindly. The interstices were of a good colour. Her upper eye-lids were swelled from a few pustules on each. The nurse had given her some boiled mutton and turnep, which she had eaten heartily. Every thing went on so well, that he had very little trouble afterwards.

By the seventh day all the pustules were turned; she was surprizingly hearty, and had been for the last four or five days in a temperate degree of heat. The weather was at this time very cold; there were no curtains to her bed; and as she had been so much chilled by a long continuance in water, and therefrom the powers of life in a very torpid state, Mr. Osborne was not apprehensive of his being able to raise too much fever; on the contrary, he was rather jealous of her not having heat enough to expel the variolous matter: but he was agreeably mistaken; for within two or three days after, she was walking about the ward, being naturally of a robust constitution, and had no other complaint but that of extreme hunger.

This instance of recovering from drowning is, with several others of the same kind, well authenticated, an argument of the expediency of always attempting to recover persons taken out of the water, however lifeless they may appear, unless their eyes are sunk, or putrefaction actually begun. The method above made use of, proved successful: but that had not been attempted, had it not been for the small degree of motion, observed by persons casually there, in her upper lip. This was no more than what is usually seen in many parts, particularly in the abdominal integuments of slaughtered beasts, even after the head has been severed from the body a considerable time. The sort of groan, which had been heard by the bearers, after she had fallen from their shoulders in bringing her to the work-house, had been paid so little attention to, that the drowned person was in very cold

cold weather, placed upon the lid of a coffin under an open arch, exposed to the air; no very proper place for one in such circumstances, whose recovery was proposed to be attempted.

But that which makes this history uncommonly singular is, that she should throw herself into the water in the febrile delirium attendant upon the eruption of the small-pox, and even after several pustules had appeared; as Mr. Osborne, when he first saw her at the work-house, observed livid spots upon the face and breast; though he then, not at that time thinking them of importance enough to be attended to, disregarded them. The cold regimen during the course of the small-pox, so much recommended by Sydenham, especially in the febrile state of this disease; and put in practice by many persons in our time in an extraordinary manner*, was never,
by

* I am informed by a lady of distinction, and I give her own words, “ that her daughter had used the cold bath ever since she was
“ six months old: that at the age of two years
“ and seven months, she was inoculated; and
“ at the inoculator’s request, the use of the
“ cold bath was continued during the whole
“ process of preparation, and even when the
“ eruption appeared; without omitting it, except one day, when she was thought visibly worse for such omission. She was therefore bathed next day by this inoculator’s express orders, and was from that time free from all feverish and disagreeable symptoms.”

Dr.

by the boldest of them, carried so far as in this instance : nevertheless, though here, from lying in the water, life for some hours seemed extinguished, the small-pox was only for a time interrupted by it ; for upon the powers of life returning, the disease went on and completed its natural course in the most desirable manner, and without any supervening accident. The cold water, though in this instance a most violent remedy, had cured both the fever and its attendant delirium ; as neither of them returned upon her coming to herself, nor after : and though the variolous eruption had been checked at the most critical time, and in the most forcible manner, the constitution did not suffer by it, as might have been feared : no spasms, fits, or other nervous symptoms, frequently the consequence of other kinds of eruptions repelled, supervening in this case.

This person was discharged from the workhouse perfectly well, and at her own request, on December 12, 1741.

Dr. Glas, in his Letter to Dr. Baker, in relation to the small-pox, page 6, mentions, in giving some account of a liquor given to inoculated patients, a lad, who had tumbled into a pond of water a little before the turn of the small-pox, i. e. just as the pustules became purulent. He received no harm from this accident, which was attributed to the putting him to bed in a flannel shirt, giving him this liquor, and sweating him plentifully for five or six hours.

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The earl of Breadalbane has done me the honour of informing me, that, in the middle of the severe winter 1739-40, one Thomas Smith, a servant belonging to his lordship, had the natural small-pox in vast numbers during the frosty weather. The delirium continued after the eruption was far advanced. The servant was put to a nurse near Conduit-street in Swallow-street; but his lordship lived then in Henrietta-street near Cavendish-square. During this delirium, and when the pustules were near maturation, while the nurse was asleep, this man, about two o'clock in the morning, got out of bed, went down stairs, and walked naked, except his shirt, to his lordship's house in Henrietta-street, whither he was followed by the watchman, who supposed him lunatic, on account of his walking in the condition he saw him, through the frozen streets. He knocked loud at the door and raised the family, who were not a little alarmed at his coming there in so unexpected and unseasonable a manner. In some time after he had been in the house, his delirium abated; and he told the people about him, that he really thought, when at the nurse's, he had heard his lady's bell ring. By his lord's orders Mr. Leyson the apothecary, now living in Marybone-street, was sent for; and by his direction he was wrapped in a blanket, and conveyed in a chair back into Swallow-street.

Besides walking through the streets, he was a considerable time knocking at lord Breadalbane's door before he was admitted; and when admitted, was obliged to wait in the hall, till his lord was awaked, and his directions received

ed in relation to the disposal of him. He was all this time in his shirt; nevertheless he received no apparent injury from this extraordinary ramble, but, considering the vast number of pustules with which he was loaded, he went through the disease very well, recovered perfectly, and, Mr. Leyson believes, is yet alive.

Lincoln's-Inn-Fields,
Feb. 11, 1768.

F I N I S.